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STEEL

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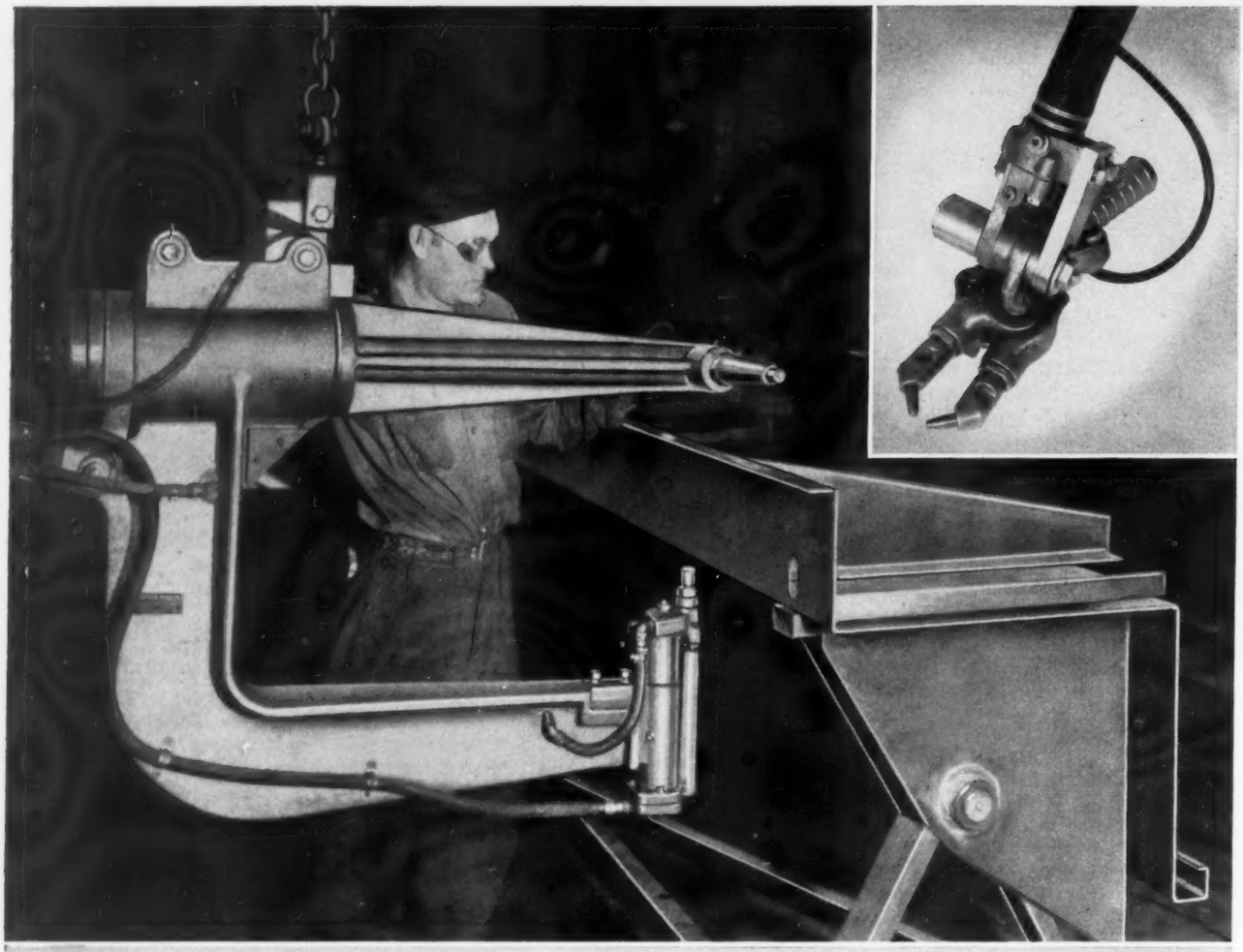

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HIGHLIGHTING
THIS ISSUE OF
STEEL

■ MILD hysteria which developed last week among some civilian steel users **(p. 24)** is unjustified. The worst that consumers have suffered to date have been mild pinches, particularly in alloy steels, but in very few cases have production lines been halted for lack of steel. . . . There is a mistaken impression, encouraged by a radio broadcast last Thursday evening, that only 40 per cent of current steel output is available to civilians; it appears to result from the fact that steelmakers estimate total defense, indirect and direct, as absorbing 60 per cent or more of the steel output. Actually, tonnage identified as "direct and indirect defense" includes large tonnages for purely civilian purposes.

• • •

Department, "Wing Tips"

In view of the widely reported "shortage" of steel, it is interesting to note that certain consumers **(p. 99)** which normally operate on short schedules at this season are running full on consumer goods to be placed on sale next spring; this is because urgency on the part of suppliers is forcing them to take in much larger tonnages than they desire; while such cases are not typical they do exist . . . With this issue STEEL **(p. 41)** amplifies its coverage of the aviation industry in a new department entitled "Wing Tips"; the purpose is to inform manufacturers of many different products and materials who are in a position to add to the momentum behind our aircraft construction program.

• • •

Consumers Pay the Freight

Some steelmakers who have been operating without profit **(p. 117)** are, with OPACS approval, quoting f.o.b. mill prices, passing freight charges on to consumers . . . Defense work **(p. 43)** is well ahead of schedule . . . Significant move is establishment by Allis-Chalmers **(p. 27)** of a priorities management group headed by a top company officer . . . Capacity for rolling light plates is to be increased **(p. 24)** by 754,000 tons . . . Measures for conserving alloy scrap **(p. 32)** are under study . . . Chromium now **(p. 34)** is on the critical list . . . Continued demands for higher wages constitute the British government's most difficult problem, says Vincent Delport **(p. 21)**; he reports the inflation spiral is not yet broken.

• • •

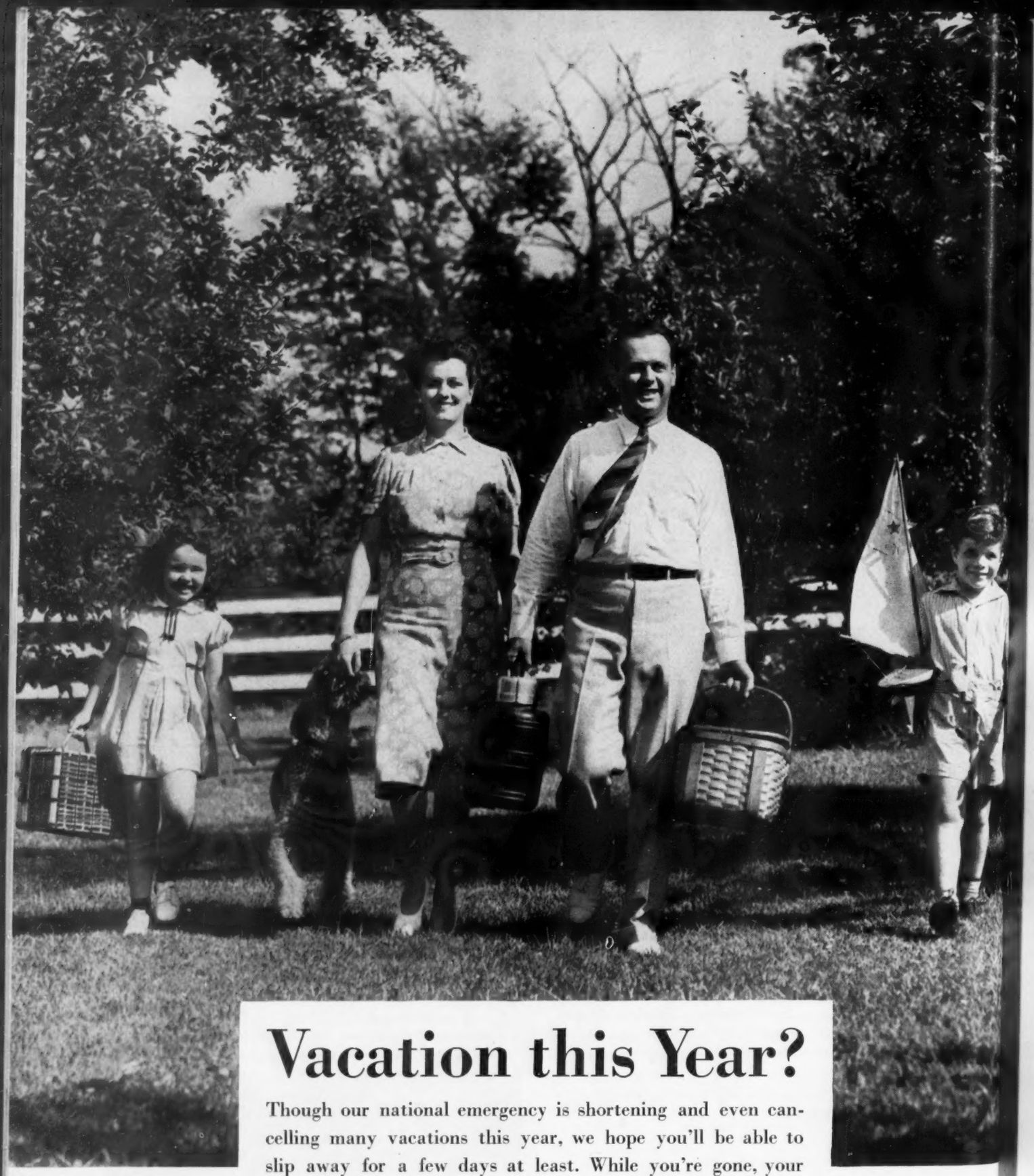
"Moly-Tung" Replaces 18-4-1

Joseph V. Emmons tells **(p. 58)** how molybdenum-tungsten high-speed steel can be used to replace the well-known 18-4-1 high-tungsten type. With 18-4-1 supply restricted by OPM, every user of high-speed tool steels should know how to employ the satisfactory substitutes now available. . . . Improved blasting equipment for descaling shell is described **(p. 52)** by John D. Alexander. Inside and outside of 75-millimeter shell are blasted at cost of only $0.0168 per shell. . . . An analysis of the crawler crane as an industrial materials handling tool is presented **(p. 64)**. . . . Apprentice training as a source of welding operators is discussed **(p. 82)** by Harold Lawrence.

• • •

Electroplating "Hard" Chromium

This week Professor Macconochie begins **(p. 54)** a study devoted to development of big guns and methods of manufacturing them. . . . How graphite is being used by many steelmakers to help swing over their cold metal charges to all steel scrap is told **(p. 71)** by R. J. Zemanek. . . . "Hard" chromium plating is assuming increasing industrial importance, according to John T. Hyduke who describes **(p. 76)** its characteristics, applications and also some unusual features of a new plant devoted almost entirely to that work. . . . Steel casings were used as piles **(p. 74)** to save several thousand dollars in constructing a foundation for a 900-ton capacity blast-furnace foundation recently.



Vacation this Year?

Though our national emergency is shortening and even cancelling many vacations this year, we hope you'll be able to slip away for a few days at least. While you're gone, your department can rely on Ryerson for the best steel-service that present-day circumstances will permit. In times like these, we are naturally out of many sizes but we still have a fair stock and service continues without interruption. So make the best of your days off . . . Relax! Build yourself up for the hard winter months ahead. Ryerson will help hold the fort.

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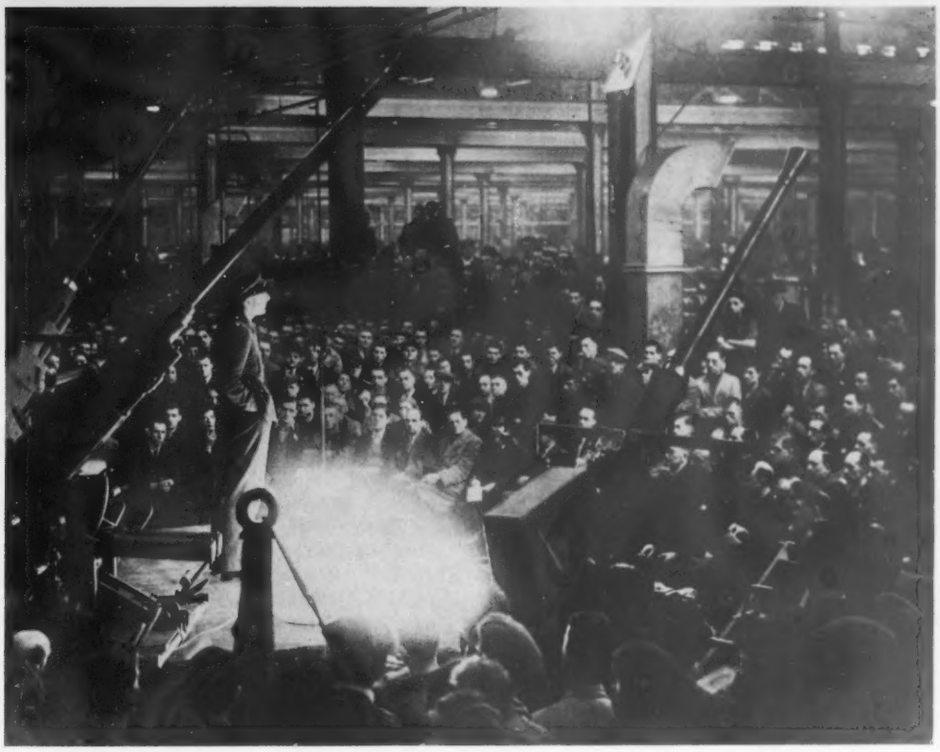


■ **OVER THERE:** English officer commends workers in an antiaircraft gun factory for their workmanship. The officer claimed as much credit for defending the island was due them as to the troops who fired the guns. British workers since the start of the war have been laboring long hours, without serious detriment to morale. NEA photo

Britain Stockpiling Steel Imported From United States

Takes opportunity in Russo-Nazi conflict to intensify war material production . . . Steel output increased . . . Domestic ores used . . . Labor shortage is problem

By VINCENT DELPORT
European Editor, STEEL

LONDON

■ WHILE Germany is engaged against Russia on the eastern front, Great Britain is intensifying the production of every type of raw material. This to a large extent depends on a speed-up of iron and steel output. That such an increase has been effected is shown by the fact that a proportion of the steel imported from the United States has been set aside, and reserves have been accumulated to the extent where American importations, especially of semifinished steel, have been materially reduced since May, and more shipping space has been allocated to prime war materials.

The satisfactory trend of steel output has been made possible by a considerable development of the production of domestic iron ore which has been increased by 50 per cent. A substantial reduction in imports of foreign ores has a restrictive effect on the output of hematite pig iron; this means that other grades are substituted in the manufacture of certain castings.

Bulk of steel output is reserved for war purposes; further restrictions were imposed recently on the use of steel and other metals for so-called luxury purposes, such as bathroom fittings, metal windows and metal furniture. On June 30, steel consumers were required to make known to the Iron and Steel Control the tonnage of steel products they had in stock at the end of the half-year. As a result of the various measures taken, deliveries of war contract materials are at present satisfactory.

Under present condition, iron and steel exports have to be restricted. Recently the president of the Board of Trade confirmed the government's policy, which is to permit exports only when they save sterling exchange necessary for essential imports; when these exports are essential to an allied nation; when the value of the exported product is high in comparison with that of the imported raw material and when the product can be made and

shipped without materially straining war resources.

A case in point is tin plate; most of the output is reserved for domestic production of food and oil containers, and exports are restricted to markets where goods are packed for re-export to Britain. The output of tin plate mills in April was about 50 per cent of capacity. Further economies in the use of tin plate will result from a recent order standardizing the size and shape of containers, and prohibiting the use of tin plate for packing about 30 commodities in addition to previous prohibitions.

Steel Controlled Prices Unchanged

There has been no change in iron and steel controlled prices since our last review. There is a belief, however, that selling prices may be increased before long owing to the rise in the cost of wages, raw materials and transport. All business is done on the understanding that prices will be those ruling at time of shipment. In May there was an increase in the price of certain grades of iron ores.

While, as can be seen, the general situation of the steel industry in Great Britain is satisfactory, there are naturally considerable difficulties to be surmounted. One of the most difficult problems is concerned with labor. It is obvious that the war effort could not be brought to its maximum without certain privileges being given up by the workers, especially as regards hours of work.

On this point the trade unions have given full co-operation, and recently, the chief labor adviser to the Iron and Steel Control stated the additional hours had not detrimentally affected the workers' health. The harder conditions under which workers are operating have justified increases of wages, but fresh demands for further increases crop up frequently and the government does not seem able to stabilize wage levels. A recent increase in wages of coal miners and of railroad workers is bound to have repercussions on the general price level and the vicious spiral which leads to inflation is not yet broken.

A satisfactory feature, however, is that there have been no important strikes to hold up production. Competition for men between the armed forces and industry, or between one industry and another, also has to be met. This does not apply so much to iron and steelworks, rolling mills, tube mills, or any concerns engaged in essential war work, but there have been some difficulties in regard to foundry workers which, however, have recently been satisfactorily settled. Strangely enough the coal mining industry has been hampered by the calling up of certain categories of miners, and also by the fact that miners have been attracted to other industries where they could earn higher wages. As coal output was becoming affected, the Minister of Labor and National Service has just taken measures to relieve the situation.

Scrap demand tends to exceed the supplies and stocks immediately available are relatively low. There are, however, substantial tonnages of iron and steel scrap lying all over the country and waiting to be collected; this constitutes a potential reserve. Curiously enough, imports of scrap from the United States during the first half of the year have been substantially less than in the first half of 1940. However, an order for about 400,000 tons was, it is reported, placed with the U. S. government in June, and the Minister of Supply recently assured Parliament that the situation was well in hand.

It is interesting to note that the chancellor of the exchequer has made a concession in regard to the excess profits tax. This remains at 100 per cent, but 20 per cent will be refunded after the war to assist industry in readjusting itself to peace conditions. A special allowance is also to be given to concerns engaged in producing metals specially required for munitions.

Conditions on the Continent are difficult to assess in view of the scarcity and vagueness of reports, particularly as regards Germany itself. In Germany a new four-year plan has been elaborated, which provides for large expansion of works and factories, entirely for armament, especially in the East. This is symptomatic and indicates the eastward trend of heavy industry, no doubt due to the vulnerability of the Ruhr and Rhine districts to British air attacks.

The French steel industry is reported to be undergoing reorganization, bringing it more and more under the control of the state. Steelworks in Alsace-Lorraine and Northern France are said to have been acquired by German interests which include the Hermann Goering group. The minette ore of the Bassin de Briey in Alsace-Lorraine is a likely source of supply for German iron and steelworks.

In Belgium there appears to be a considerable amount of resistance against German excroachments. Passive resistance is reported from the coal mines and strikes have occasionally broken out among the miners. Iron and steel production is below normal. At the end of 1940, 23 blast furnaces were operating, as against 44 at the end of 1939. Output of raw steel in Belgium in 1940 was about 40 per cent less than in 1939. It is reported that Germans are acquiring shares in Belgium enterprises and placing their own men at key posts in concerns that are showing signs of resistance. A certain limited tonnage of exports amounting to 3000 tons a month has been allowed toward Holland, Denmark, Norway and Finland; payments are made by a clearing arrangement through Berlin.

Italian iron and steel industry is

■ **WOMEN'S PLACE: In England it also is in defense industries, as demands of the armed forces cause a shortage of male laborers. Photo shows women operating machines which turn out parts for antitank guns in a ministry of supply factory "somewhere in England." NEA photo**

carrying on under difficulties, especially as regards scrap supplies. Assistance from Germany is obtained in the form of imports of semifinished steel. Increasing use is being made of electric furnaces for the production of pig iron. Iron and steel prices were fixed in Italy at the beginning of the war and no alterations have been made since, although an increase is expected.

Sweden has been adversely affected by the war since the occupation of Norway in the spring of last year. Most of her usual export markets were lost and a complete reshaping was made necessary. The country has, however, managed to keep going thanks to intensified production of armaments for defense and to the establishment of new industries. Spain's iron ore industry is relatively maintained although the output in 1940 was nearly 10 per cent below 1939, mainly due to a sharp reduction of export trade.

Germany's sudden, if not entirely unexpected, attack on Soviet Russia holds both economic and military possibilities of great importance.

As the simplest explanations are often the most correct, the following appears a plausible cause for the Nazi action: Hitler knows he cannot win the war unless he beats Britain in her own island stronghold. His eyes are now open to the fact that to beat Britain he must hurl against her the whole and the best of his air and land forces—and what is left of the German and Italian navies. His fear of Russia's growing strength induces him to maintain strong and well trained forces all along his eastern frontier. He realizes also the possibility that he may not succeed in winning the war this year, and in the background looms the rapidly increasing menace of American help to Britain and her allies.

"Two Birds With One Stone"

Therefore by rushing against Russia before she has attained her full strength, Hitler gambles killing two birds with one stone; to remove the fear of an invasion of Germany's eastern frontier while engaged in the major battle against Britain, and to secure considerable sources of valuable supplies in Ukraine and the Caucasus.

The sources of supply comprise not only the wheat of Ukraine and the oil of the Caucasus region but also valuable resources of iron and manganese ore. It has already been indicated in these articles that Germany is self sufficient as regards iron and steel but that she was faced with the problem of obtaining iron ore of a suitable grade for economic production. The problem is no doubt partly solved since Germany can now draw upon Swedish and French ore production. However, supplementary supplies from South Russia would be a great asset, especially as the mines would be relatively safe from air attack, and they could be used for supplying steelworks in Eastern Germany, and in Bohemia-Moravia; these works are of great importance as they would be much less subjected to air attacks than the Ruhr and Rhineland works, once Russia was subjugated.

Of greater interest still to Germany is manganese ore, which is found in India, Brazil and South Russia. Supplies from India can be ruled out and imports from Brazil have to come across the Atlantic. South Russia is therefore the only practical source of supply of manganese ore for German works.

(For inventory of Russia's metals and other resources, see STEEL, June 30, p. 15.)

An additional prize, which might come within reach of German ambitions, is the nickel mines of Petsamo in the north of Finland.

625,000 Tons Semifinished To Be Shipped to Britain

Question of allocation of 625,000 tons of semifinished steel for shipment to Great Britain over the remainder of the current quarter was settled last week and the Treasury's procurement division soon will formally make the awards under the lease-lend act.

Allocation of 420,000 tons of tin plate for shipment to Great Britain and her colonies over the next year is being considered. This tonnage has been pending for some weeks.

Defense, Aid-to-Britain Steel Needs "Only 22 Per Cent of 1941 Production"

■ "NO SOUND factual basis for expecting a shortage of steel supply for any essential use" exists, Walter S. Tower, president, American Iron and Steel Institute, declared before the annual meeting of the purchases and stores division of the Association of American Railroads in Chicago last week.

If any acute condition in respect to steel supply is to be experienced, it is already close at hand because of the coincidence of various pressing demands for early delivery, he said.

"Like a river in flood, that sort of demand rises rapidly to the crest, but it does not last forever.

"Rated steelmaking capacity today is more than 85,000,000 net tons of ingots in a year. Next year it will be substantially more. If pushed by stern necessity for the last available ton, the industry as it now stands probably could make at least 87,000,000 tons in 12 months, provided there were no interruptions in flow of materials and supply of labor. So far this year, and it is half gone, actual output has been at the rate of about 82,000,000 tons, with no record of important lack of steel for any essential industry.

"Some users for civilian purposes have taken record-breaking quantities. Competent outside observers come to the conclusion that production has been consistently ahead of actual consumption. Inventories are reported to be still on the increase, and probably at the highest level ever known.

"The first charge against the present potential supply is for enough tonnage to meet all domestic military uses, including army, navy and Maritime Commission programs. Close beside that comes the tonnage which we are committed to furnish for Britain and Canada. For this calendar year, 1941, according to current official estimates and reports, those two items, defense program and British-Canadian tonnages, represent an ingot equivalent of not more than 18,000,000 tons.

(Editor's note: 18,000,000 tons of steel represents not more than 22 per cent of probable 1941 production.)

"For the calendar year 1942, the current estimate for our own program is a little larger. The British need next year is still uncertain, but is hardly likely to expand very much, when the limiting factor of shipping space is considered.

"Available facts, therefore, justify the belief that both in this year and in 1942 there will be fully 67,000,000 tons of steelmaking capacity which can be used for domestic civilian consumption and for whatever exports may seem desirable to countries other than Britain and Canada.

"Such other exports are not likely to call for more than 3,000,000 tons of ingots, leaving a minimum of 64,000,000 tons for domestic civilian uses. This country has never in any year been able to use any such quantity of steel. Even in 1940 total domestic consumption including defense and civilian uses was only 55,000,000 tons.

"But, say the prophets of scarcity, national income will rise to unheard

of levels, and the resulting demand for steel will be terrific. The broad answer to them is that the theory of intimate connection between national income and demand for steel is not sound, and it is particularly unsound under the distorted conditions of wartime economy.

"So far there have been no figures offered by anyone to show that maximum defense requirements will amount to more than a minor fraction of total ability of the industry to produce steel. Nor is there any basis in facts for expecting that civilian consumption of steel products will take more than will be available, after the needs of the defense program have been satisfied.

Interprets Dunn Report

"A careful reading of the recent report to the President by Gano Dunn reveals the conclusion that in his considered opinion, after studying the subject intensively for several months, expansion of steelmaking capacity is not now justified beyond the normal and natural increase which is always going on in the industry, plus certain special additions, like electric furnaces, to meet specific defense requirements.

"Any other conclusion, I think, is untenable because it must be based on the theoretical assumption that requirements for nonmilitary uses will soar to fantastic levels. Instead of an orgy of consumption, some sacrifice by every one is the likely price of this job that this country faces."

Any real shortage of steel for nonmilitary uses seems both unlikely and unnecessary, Mr. Tower said.

"Should the unlikely happen, it will come early, it will be brief, and it can be dealt with only in one way; that way is temporarily to ration or to curtail the more dispensable uses. The machinery for such action already exists. It could be applied promptly. It should not be necessary to use it generally, or for very long in any case.

"Any such condition, if it should happen, could not be dealt with by a program of wholesale expansion. Here and there, as I have pointed out, additions to steelmaking facilities are under way all the time. Some important ones are due to become productive before the end of this year or in the course of 1942. But any large scale expansion must be a matter of many months to create. Probably very little of 'the 10 million ton program,' which is referred to so blithely by the unknowing, could be realized within two years."

Estimates Vary Widely, but Users Are Getting Steel

Some steelmakers last week estimated about 30 per cent of current steel output is going to direct defense and that indirect defense is taking 30 to 50 per cent of the total.

These figures led a nationally-known business publication to broadcast over the radio Thursday evening that only 40 per cent of the current steel output is available for civilian purposes.

The explanation is that the estimated 60 to 80 per cent of steel going into "direct and indirect defense" actually includes a huge amount used for purely civilian purposes.

While Mr. Tower's computation in the foregoing article does not differentiate specifically between direct and indirect defense needs, it can be accepted as a fair assurance that there is no immediate threat to the supply of steel for civilian use.

Light Plate Capacity To Be Raised 754,000 Net Tons

WASHINGTON

■ CAPACITY of wide strip steel mills to make light plates for ships, railroad cars and other purposes will be increased 754,000 tons to a total of 2,480,000 tons by the early part of 1942, according to OPM.

The increase will be brought about by construction programs now under way at a number of the mills.

W. A. Hauck, OPM steel consultant, disclosed the outlook after visiting several strip mills and compiling results of a questionnaire submitted recently to the 13 mills rolling strip 54 inches or more wide.

Present total annual capacity of these mills is 12,941,400 tons, of which 1,726,000 is light plate capacity and 11,215,400 is capacity for the manufacture of strip. Of the additional plate capacity to be provided, 654,000 tons will be obtained gradually by the end of this year and the other 10,000 will be available by March 1, 1942.

Light plate production on the strip mills in May, 1941, was 108,772 tons. For the first five months of 1941 it averaged 97,013 tons per month, compared with a current capacity of 143,833 per month. This average unused capacity of 46,820 tons is to be absorbed gradually by the reallocation of suitable orders for light plates and the placing of new orders.

A regulation will be issued shortly to all steel companies with strip and plate capacity, requesting them to reallocate to strip mills plates now scheduled for the regular plate mills, in cases where the sizes and quantities are better suited for strip mill production.

All new orders for light plates of sizes and quantities suitable for strip mill production will be allocated to strip mills in the best position to produce such plates when needed, Mr. Hauck said, adding that this arrangement should relieve the heavier plate mills of a considerable amount of the light plate tonnage more suitable for strip mills and enable them to concentrate on heavier plate orders.

Additional heavier plate capacity is being installed by some of the companies that have strip mills, and more plate capacity is being provided also by companies not operating strip mills. Further additional plate capacity is proposed in the overall expansion of the steel industry now under consideration.

Most of the plates rolled on strip mills are ¾-inch or less in thickness, although four of the strip mills can also roll ¾-inch plates. To obtain maximum production of light plates on strip mills, large tonnages in uniform sizes as to length, width and thickness must be scheduled, since strip mills are geared for speed with little interruption.

National Tube Rebuilding Blast Furnace at Lorain

National Tube Co., subsidiary of United States Steel Corp., is rebuilding one of its five blast furnaces at Lorain, O. Daily capacity will be increased 350 tons from 750 to 1100 tons.

OPACS Studies Price Ceiling for Cadmium

■ OPACS last week conferred with leading producers, distributors and users of cadmium, gathered information on the metal, and discussed the desirability of establishing a formal maximum price, in place of the present informal 90 to 95-cent producers' rate.

Practically all cadmium is being sold at the producers' price, but some small second-hand lots are selling at $1.50 to $1.75 per pound with one unconfirmed report of $2.25. There is a possibility of OPM priority on cadmium distribution. Cadmium is as tight as zinc, from whence it comes.

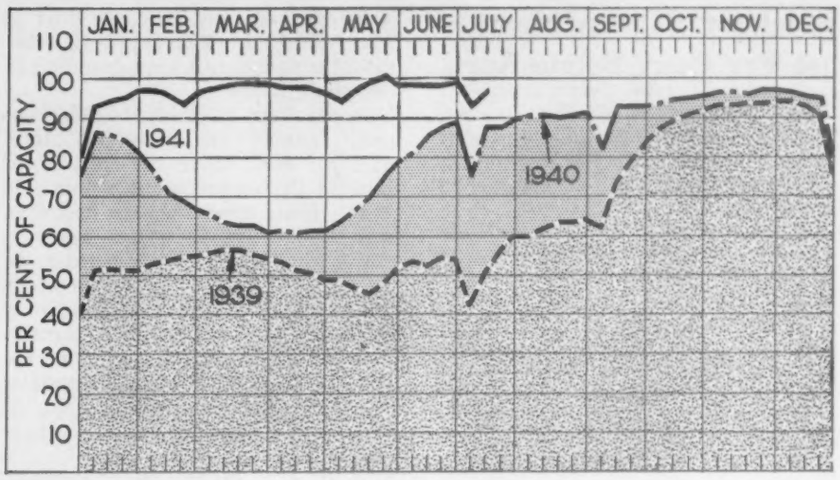
First Half Ingot Output Nearly 41,000,000 Tons

■ Production of steel ingots and castings in the record-breaking first six months of 1941 totaled 40,911,886 net tons. This is within 20 per cent of output in all 1917, the peak year of the first World war, according to the American Iron and Steel Institute. It is nearly 40 per cent larger than the 29,405,402 tons produced in first half, 1940.

During the past six months the industry operated at an average of 98 per cent of capacity, compared with 72.4 per cent in the period last year, and 91.6 in the second half of last year.

In 1917 operations averaged 90.8 per cent of the capacity existing then, which was approximately 55,600,000 tons annually, one-third less than present capacity of more than 84,150,000 tons.

June output this year totaled 6,800,730 tons, at 98.2 per cent of capacity, compared with 7,055,132 tons, 98.7 per cent of capacity, in May. June output in 1940 was 5,657,443 tons, 84.5 per cent of capacity.



PRODUCTION . . . . Up

■ STEELWORKS operations last week advanced 4 points to 97½ per cent of capacity, regaining most of the ground lost in the week of July 4. A year ago the rate was 88 per cent; two years ago, 50½.

Birmingham, Ala. — Steady at 90 per cent, with 22 open hearths in production.

Buffalo — Rebounded 17½ points to 93 per cent, 2½ points above the rate during the last three weeks of June.

St. Louis — Held at 98 per cent, 27 of 28 open hearths in service.

Chicago — Down 1 point to 100½ per cent, from the revised rate of 101½ per cent the preceding week.

Detroit — Up 13 points to 96 per cent, only one open hearth idle.

Central eastern seaboard — Advanced 5 points to 97 per cent.

Pittsburgh — Several furnaces down for repairs were relighted, lifting the rate 2 points to 99½.

Wheeling — Rose 4 points to 91 per cent, highest since January and February.

Cleveland — Gained 4 points to 96½ per cent.

New England — Unchanged at 90 per cent.

Youngstown, O. — With 77 open hearths and three bessemers in production the rate was 98 per cent, up 8 points.

Cincinnati — Advanced 6½ points to 88 per cent.

Steel Ingot Statistics

	Estimated Production—All Companies								Calculated weekly production, all companies	Number of weeks in month
	—Open Hearth—		—Bessemer—		—Electric—		—Total—			
	Net tons	Per cent of capacity	Net tons	Per cent of capacity	Net tons	Per cent of capacity	Net tons	Per cent of capacity	Net tons	
Based on Reports by Companies which in 1940 made 92.91% of the Open Hearth, 100% of the Bessemer and 85.82% of the Electric Ingot and Steel for Castings Production										
1941										
Jan. . .	6,271,862	99.0	451,637	76.0	205,256	93.4	6,928,755	96.9	1,564,053	4.43
Feb. . .	5,673,289	99.2	378,330	70.5	186,281	93.9	6,237,900	96.6	1,559,475	4.00
Mar. . .	6,461,936	102.0	460,169	77.4	209,536	95.4	7,131,641	99.7	1,609,851	4.43
1st quar	18,407,087	100.1	1,290,136	74.8	601,073	94.2	20,298,296	97.8	1,578,406	12.86
Apr. . .	6,130,638	99.9	395,009	68.6	232,081	109.1	6,757,728	97.6	1,575,228	4.29
May . .	6,360,211	100.4	444,361	74.8	250,560	114.0	7,055,132	98.7	1,592,581	4.43
June .	6,103,767	99.5	458,242	79.6	238,721	112.2	6,800,730	98.2	1,585,252	4.29
2nd qtr	18,594,616	99.9	1,297,612	74.3	721,362	111.8	20,613,590	98.2	1,584,442	13.01
1st half	37,001,703	100.0	2,587,748	74.5	1,322,435	103.1	40,911,886	98.0	1,581,441	25.87
Based on Reports by Companies which in 1940 made 98.43% of the Open Hearth, 100% of the Bessemer and 85.82% of the Electric Ingot and Steel for Castings Production										
1940										
Jan. . .	5,356,444	85.7	285,447	56.1	122,832	77.0	5,764,723	83.4	1,301,292	4.43
Feb. . .	4,208,249	72.1	205,458	43.2	112,090	75.2	4,525,797	70.0	1,093,188	4.14
Mar. . .	4,078,843	65.3	191,568	37.6	118,772	74.5	4,389,183	63.5	990,786	4.43
1st quar	13,643,536	74.4	682,473	45.7	353,694	75.6	14,679,703	72.3	1,129,208	13.00
Apr. . .	3,808,031	62.9	176,419	35.8	116,024	75.1	4,100,474	61.2	955,821	4.29
May . .	4,583,771	73.4	258,741	50.8	125,270	78.5	4,967,782	71.8	1,121,395	4.43
June .	5,222,120	86.3	305,115	61.9	130,208	84.3	5,657,443	84.5	1,318,751	4.29
2nd qtr.	13,613,922	74.2	740,275	49.5	371,502	79.3	14,725,699	72.5	1,131,875	13.01
1st half	27,257,458	74.3	1,422,748	47.6	725,196	77.4	29,405,402	72.4	1,130,542	26.01
July . .	5,269,701	84.5	322,567	63.5	132,357	83.2	5,724,625	83.0	1,295,164	4.42
Aug. . .	5,670,932	90.8	369,770	72.6	145,681	91.3	6,186,383	89.5	1,396,475	4.43
Sept. .	5,535,198	91.7	365,289	74.2	155,759	101.1	6,056,246	90.6	1,415,011	4.28
3rd qtr.	16,475,831	89.0	1,057,626	70.1	433,797	91.7	17,967,254	87.7	1,368,412	13.13
9 mos.	43,733,289	79.2	2,480,374	55.1	1,158,993	82.2	47,372,656	77.5	1,210,339	39.14
Oct. . .	6,059,792	97.0	408,317	80.2	176,433	110.6	6,644,542	96.1	1,499,897	4.43
Nov. . .	5,872,162	97.1	420,448	85.3	176,497	114.2	6,469,107	96.6	1,507,950	4.29
Dec. . .	5,907,840	94.8	399,434	78.6	188,083	118.2	6,495,357	94.1	1,469,538	4.42
4th qtr.	17,839,794	96.3	1,228,199	81.3	541,013	114.3	19,609,006	95.6	1,492,314	13.14
Total. .	61,573,083	83.5	3,708,573	61.7	1,700,006	90.3	66,981,662	82.1	1,281,210	52.28

The percentages of capacity for 1940 are calculated on weekly capacities of 1,410,130 net tons open hearth, 114,956 net tons Bessemer and 36,011 net tons electric ingots and steel for castings, total 1,561,097 net tons; based on annual capacities as of Dec. 31, 1939 as follows: Open hearth 73,721,592 net tons. Bessemer 6,009,920 net tons, electric 1,882,630 net tons.

The percentages of capacity for 1941 are calculated on weekly capacities of 1,430,102 net tons open hearth, 134,187 net tons Bessemer and 49,603 net tons electric ingots and steel for castings, total 1,613,892 net tons; based on annual capacities as of Dec. 31, 1940 as follows: Open hearth 74,565,510 net tons, Bessemer 6,996,520 net tons, electric 2,586,320 net tons.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended July 12	Change	Same week 1940	Same week 1939
Pittsburgh	99.5	+ 2	80	44
Chicago	100.5	— 1	95	50
Eastern Pa. ...	97	+ 5	84	40
Youngstown ..	98	+ 8	84	53
Wheeling	91	+ 4	94	79
Cleveland	96.5	+ 4	77	43
Buffalo	93	+17.5	90.5	37
Birmingham ..	90	None	88	80
New England..	90	None	85	40
Cincinnati	88	+ 6.5	77.5	21
St. Louis	98	None	65	45
Detroit	96	+13	92	64
Average	97.5	+ 4	88	50.5

Steel for Sale in May 1.4 Per Cent Below April

■ Steel produced for sale in May totaled 5,196,563 net tons, 73,185 tons, or 1.4 per cent, less than 5,269,748 tons in April, according to the American Iron and Steel Institute.

Exports in May, 305,963 tons, were 25,979 tons below 331,942 exported in April, a loss of 7.8 per cent. Shipments to other members of the industry for further conversion totaled 356,117 tons, 28,434 tons, or 8.7 per cent, more than in April.

May production was 1,619,703 tons greater than the 3,576,860 tons in May, 1940, up 45.3 per cent. Details for the month are presented in the table below.

Production in five months this year aggregated 24,907,500 tons, 45.1 per cent more than 17,160,063 tons in the corresponding period in 1940. Production for sale, less shipments to members of the industry for further conversion, related to estimated yield of 71.1 per cent of ingots, was 103.6 per cent of capacity in May and 102.3 per cent for five months. Of total production, exports were 5.9 per cent, compared with 6.29 per cent in April and 13.33 per cent in May, 1940. Summary by months, in net tons, follows:

1940	Output	Exported	Pct. Exported
April....	3,005,218	371,532	12.37
May.....	3,576,860	476,761	13.33
June	3,802,485	601,668	15.8
July	4,173,839	835,385	20.0
Aug.	4,649,065	1,053,110	22.6
Sept.	4,446,555	951,555	21.4
Oct.	4,937,388	783,652	15.87
Nov.	4,760,948	562,587	11.82
Dec.	4,909,448	713,802	14.5
Year	48,584,860	7,683,858	15.8
1941			
Jan.	5,163,912	558,198	10.8
Feb.	4,864,936	560,035	11.5
March...	5,411,319	491,519	9.07
April ...	5,269,748	331,942	6.29
May	5,196,563	305,963	5.9

		Number of companies	Items	Annual Capacity Net tons	Production for Sale—Net Tons: Current Month: Total	Current Month: Per cent of capacity	Current Month: Shipments: Export	Current Month: Shipments: To members of the industry for conversion into further finished products	Year to Date: Total	Year to Date: Per Cent of capacity	Year to Date: Shipments: Export	Year to Date: Shipments: To members of the industry for conversion into further finished products
Steel Products	Ingots, blooms, billets, slabs, sheet bars, etc.	34	1	xxxxxxx	425,762	xxx	20,370	179,822	2,472,343	xxx	622,919	754,493
	Heavy structural shapes	7	2	4,730,200	398,497	99.2	11,739	xxxxxxx	1,828,733	93.4	81,125	xxxxxxx
	Steel piling	3	3	248,000	24,977	118.5	691	xxxxxxx	104,812	102.1	11,612	xxxxxxx
	Plates—Sheared and Universal	18	4	5,496,590	472,356	101.1	24,028	2,512	2,199,804	96.7	176,729	10,994
	Skelp	8	5	xxxxxxx	91,949	xxx	19,165	33,299	441,071	xxx	69,349	180,499
	Rails—Standard (over 60 lbs.)	4	6	3,613,600	169,348	55.2	755	xxxxxxx	776,124	51.9	32,144	xxxxxxx
	Light (60 lbs. and under)	6	7	302,800	13,961	54.3	4,913	xxxxxxx	80,957	64.6	31,751	xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	102,000	2,115	24.4	114	xxxxxxx	9,827	23.3	1,499	xxxxxxx
	Splice bar and tie plates	14	9	1,210,600	72,315	70.3	1,367	xxxxxxx	318,157	63.5	8,333	xxxxxxx
	Bars—Merchant	34	10	xxxxxxx	520,968	xxx	25,676	62,985	2,599,034	xxx	250,043	299,560
	Concrete reinforcing—New billet	15	11	xxxxxxx	135,255	xxx	19,727	xxxxxxx	589,723	xxx	96,963	xxxxxxx
	Rerolling	17	12	xxxxxxx	22,057	xxx	1,427	xxxxxxx	67,871	xxx	4,913	xxxxxxx
	Cold finished—Carbon	19	13	xxxxxxx	108,374	xxx	1,416	xxxxxxx	507,082	xxx	9,311	xxxxxxx
	Alloy—Hot rolled	15	14	xxxxxxx	143,678	xxx	12,607	14,089	656,222	xxx	63,206	65,164
	Cold finished	16	15	xxxxxxx	17,895	xxx	2,016	xxxxxxx	79,854	xxx	9,872	xxxxxxx
	Hoops and baling bands	5	16	xxxxxxx	10,381	xxx	234	xxxxxxx	43,018	xxx	1,690	xxxxxxx
	TOTAL BARS	52	17	11,600,185	958,608	97.3	63,103	77,074	4,542,804	94.6	435,998	364,724
	Tool steel bars (rolled and forged)	16	18	127,870	9,745	89.7	572	xxxxxxx	45,496	86.0	3,353	xxxxxxx
	Pipe and tube—B. W.	13	19	2,049,200	134,986	77.5	12,907	xxxxxxx	640,698	75.5	51,533	xxxxxxx
	L. W.	8	20	885,260	41,311	54.9	3,050	xxxxxxx	197,304	53.9	14,044	xxxxxxx
	Electric weld	4	21	466,020	46,458	117.3	7,981	xxxxxxx	175,908	91.2	11,370	xxxxxxx
	Seamless	15	22	3,003,840	182,765	71.6	17,029	xxxxxxx	858,910	69.1	80,950	xxxxxxx
	Conduit	6	23	152,145	11,719	90.7	263	xxxxxxx	55,881	88.7	934	xxxxxxx
	Mechanical Tubing	12	24	461,725	43,983	112.1	3,301	xxxxxxx	196,107	102.6	19,367	xxxxxxx
	Wire rods	19	25	xxxxxxx	126,962	xxx	11,256	21,423	637,457	xxx	69,060	109,295
	Wire—Drawn	37	26	2,291,250	199,747	102.6	12,638	1,922	904,978	95.4	64,890	9,456
	Nails and staples	19	27	1,120,610	68,236	71.7	7,477	xxxxxxx	346,653	74.7	29,859	xxxxxxx
	Barbed and twisted	16	28	458,210	24,382	62.6	6,532	xxxxxxx	119,320	62.9	27,527	xxxxxxx
	Woven wire fence	15	29	771,180	28,991	44.2	106	xxxxxxx	140,730	44.1	917	xxxxxxx
	Bale ties	10	30	110,980	8,535	90.5	59	xxxxxxx	32,088	69.9	99	xxxxxxx
	All other wire products	5	31	24,280	659	31.9	-	xxxxxxx	2,655	26.4	-	xxxxxxx
	Fence posts	13	32	136,195	6,970	60.2	58	xxxxxxx	30,431	54.0	479	xxxxxxx
	Black plate	10	33	296,435	40,135	159.4	7,350	35	152,609	124.4	11,540	42
	Tin plate—Hot rolled	7	34	352,700	27,209	90.8	3,026	xxxxxxx	111,499	76.4	7,567	xxxxxxx
	Cold reduced	9	35	3,061,440	217,150	83.5	20,247	xxxxxxx	919,222	72.5	75,956	xxxxxxx
	Sheets—Hot rolled	23	36	xxxxxxx	599,104	xxx	24,913	18,197	2,860,321	xxx	130,589	88,676
	Galvanized	13	37	xxxxxxx	133,253	xxx	8,442	xxxxxxx	714,490	xxx	52,702	xxxxxxx
	Cold rolled	15	38	xxxxxxx	237,413	xxx	4,390	xxxxxxx	1,185,974	xxx	21,478	xxxxxxx
	All other	13	39	xxxxxxx	62,953	xxx	1,668	xxxxxxx	311,883	xxx	9,083	xxxxxxx
	TOTAL SHEETS	26	40	12,137,550	1,032,723	100.1	39,413	18,197	5,072,668	101.0	213,852	88,676
	Strip—Hot rolled	22	41	2,666,140	160,859	71.0	4,765	21,833	765,080	69.3	27,720	104,025
	Cold rolled	33	42	1,258,700	99,419	93.0	972	xxxxxxx	468,193	89.9	4,711	xxxxxxx
	Wheels (car, rolled steel)	5	43	422,825	22,026	61.3	87	xxxxxxx	105,864	60.5	238	xxxxxxx
	Axles	4	44	472,280	13,374	33.3	500	xxxxxxx	71,664	36.7	882	xxxxxxx
	Track spikes	10	45	319,435	14,993	55.2	129	xxxxxxx	71,964	54.4	1,418	xxxxxxx
	All other	4	46	24,100	3,358	164.0	-	xxxxxxx	9,489	95.1	79	xxxxxxx
	TOTAL STEEL PRODUCTS (a)	133	47	xxxxxxx	5,196,563	xxx	305,963	356,117	24,907,500	xxx	2,189,804	1,622,202
	Pig iron, ferro manganese and spiegel	23	48	xxxxxxx	581,304	xxx	46,927	157,847	2,972,665	xxx	223,767	885,247
	Ingot moulds	4	49	xxxxxxx	62,481	xxx	591	xxxxxxx	301,644	xxx	1,153	xxxxxxx
Iron Products	Bars	9	50	109,195	5,716	61.6	7	364	25,786	57.1	16	1,413
	Pipe and tubes	3	51	109,300	6,223	67.0	530	xxxxxxx	26,721	59.1	889	xxxxxxx
	All other	2	52	71,000	1,035	17.2	-	-	7,799	26.5	1,181	-
	TOTAL IRON PRODUCTS (ITEMS 50 to 52)	11	53	224,995	12,974	67.9	537	364	60,306	64.8	2,086	1,413

Total Number of Companies Included - 150.

(a) Reported by 133 Companies, which in 1940 produced 91% of that Year's Total Output of Finished Rolled Products.

The estimated average yield of products for sale from ingots produced by the companies included above is 71.1 *%, which applied to their total ingot capacity equal* 4,980,400 *net tons of finished rolled products.*

Production for sale, less shipments to members of the industry for further conversion, related to the estimated yield is as follows:

Current month 4,840,446 *N. T.;* 103.6 *%*

Year to date 23,285,298 *N. T.;* 102.3 *%*

Priorities Management Department Established by Allis-Chalmers

■ ALLIS-CHALMERS MFG. CO., Milwaukee, has organized a priorities management group to direct the company's activities where preference ratings are involved, Max W. Babb, company president, announced last week.

"It has become necessary," he said, "that an organization should be set up to help in directing the company's activities in matters pertaining to priorities. General purpose of this organization is one of co-ordination and assistance and is not designed to take over any of the obligations and duties which are now a function of other departments.

"To this end the priorities management department at Allis-Chalmers has been established with L. W. Grothaus, vice president, as its head, G. V. Woody as administrator, and O. S. Larkby Jr. as his first assistant.

"The priorities management will have direction of: Presenting for the company matters concerning priorities to the Office of Production Management and all other government departments or regulating bodies, including congressional, governmental or industry committees; the application of priorities to the company's suppliers of materials; the work being done by the company through its different departments on the matter of industry priorities as distinguished from a priority issued for specific contracts; helping to determine from the interested departments or from governmental agencies, such information as will permit the shop to arrive at a proper decision in the problem of conflict of shop schedules between two or more jobs bearing the same priorities.

"The administrator will, from time to time, issue such information and instructions to the heads of departments as are necessary to guide the work of these departments in connection with this subject.

"All departments, including the tractor division and others holding prime interest in this subject, are to confer with the administrator of priorities, or in his absence, with his assistant, on all subjects regarding priorities before announcements or instructions are issued."

Hand-Finishing Howitzers for the Army

■ **These 75-mm. howitzers, produced under scrutiny of Army inspectors at the Erie, Pa., works of General Electric Co., are rated as having the highest striking power for their weight of all the Army's guns. They will hurl 14-pound projectiles 9500 feet. Workmen in the plant's motor department are hand-finishing and fitting the howitzers. NEA photo**

War Materials Plants Financed by Government

■ Reconstruction Finance Corp. last week reported a $125,000 loan to Perfection Gear Co., Harvey, Ill., "in connection with the national defense program." Loan of $3,182,000 to Thompson Aircraft Products Co., Cleveland, to be used in manufacturing airplane engines and airplanes also was announced.

Defense Plant Corp. lease agreements reported:

Increase of $75,000 for reconditioning two ferromanganese blast furnaces of Tennessee Products Corp., Nashville, Tenn.;

Construction and equipment of a copper products plant at Los Angeles at cost of $2,995,000, for Phelps Dodge Copper Products Corp.;

Increase of $2,916,013 for buildings and equipment for new parts plant, Consolidated Aircraft Corp., San Diego, Calif.;

Erection and Equipment of a plant at Lansing, Mich., for Nash-Kelvinator Corp., to cost $15,150,744, for aircraft parts production;

Increase of $500,000 in agreement with American Brass Co., Kenosha, Wis., for additional construction costs at its ammunition components plant.

Industrial Machinery Imports Decline 48%

■ Industrial machinery imports into United States in 1940 totaled $4,125,661, down 48 per cent from $7,893,152 in 1939, according to the Department of Commerce. Most important factor in the decrease was the large drop in purchases from Germany, to $175,335 from $3,639,354.

Imports from other countries from which United States purchases industrial machinery remained fairly steady. United Kingdom's exports of this equipment to the States in 1940 totaled $2,026,879, compared with $2,052,203 in 1939. Industrial machinery imports from other nations last year: Sweden, $635,454; Switzerland, $633,792; Canada, $289,010; and France, $114,845.

About 25 per cent of all industrial machinery imports was textile machinery. Metalworking machinery imports totaled $403,772, and engines and parts $420,190. Other types of industrial machinery imported: Sewing machines and parts, antifriction bearings, shoe machines, paper and pulp mill machinery, tobacco and cigarette making machinery.

MEN of INDUSTRY

■ **JAMES MACBETH JR.,** has been named manager of pig iron sales, and **B. E. Stewart,** manager of by-product sales, Jones & Laughlin Steel Corp., Pittsburgh. The two new managers succeed the late M. W. St. John. Mr. MacBeth's entire business experience has been with Jones & Laughlin, having started in 1915 after attending Carnegie Institute of Technology.

Mr. Stewart, a graduate of West Virginia University, has been head chemist of the by-product laboratory, Aliquippa works, since 1937, and before that was chemist, Northern West Virginia Coal Operators Association.

♦

W. W. Rector has been elected vice president and director, American Fork & Hoe Co., Cleveland.

♦

Kenneth Kemp has been named manager, Precision Parts Co., Holland, Mich., succeeding **Herbert J. Francis.**

♦

Ralph M. Fawcett has been elected president, Republic Stamping & Enameling Co., Canton, O. He succeeds **Howard B. Fawcett,** now chairman of the board.

♦

E. H. Alexander has been appointed engineer, Industrial Control Division, General Electric Co.'s Industrial Department. He has been associated with the company since 1925.

♦

Paul Fielden, associated with Norton Co., Worcester, Mass., 21 years as assistant credit manager and credit manager, has been named director of purchases. **John Miller,** a number of years assistant credit manager, succeeds Mr. Fielden as credit manager. **Marcus W. White** retains the position of purchasing agent.

♦

Frank K. Howell has joined Hawkins-Hamilton Co., Richmond, Va., and will be engaged in sales engineering work, handling products of Cochrane Corp., Andale Co., Crosby Gauge & Valve Co., Detroit Stoker Co., Hays Corp., United Conveyor Corp., and others.

James MacBeth Jr.

B. E. Stewart

Paul Fielden

♦

Harry H. Orr, assistant superintendent, Chicago & Eastern Illinois railroad, has been named assistant to the president.

♦

Edmund R. Walker has been promoted to assistant to general manager, Fedders Mfg. Co., Buffalo, N. Y. He formerly was manager of the company's air conditioning division.

♦

Henry Wilder, Heald Machine Co., Worcester, Mass., has been appointed regional chairman for the Worcester district of the Emergency Defense Training Committee, American Society of Tool Engineers.

♦

Charles R. Helmbold has joined the sales staff of Edison-Emark Battery Division, Thomas A. Edison Inc., Kearny, N. J., with headquarters in Philadelphia, covering the mid-Atlantic territory.

♦

Elmer E. Forslind has joined the New England sales staff of Foxboro Co., Foxboro, Mass., as sales engineer. **William W. Nelson,** the past four years a Foxboro service engineer, has been transferred to the New England sales force.

♦

S. D. Distelhorst, sales promotion manager, Cochrane Corp., Philadelphia, was awarded a professional engineering degree by Purdue University June 8. He was graduated from Purdue in 1935 with a bachelor of science degree in electrical engineering.

♦

George Terborgh has been elected secretary, Machinery and Allied Products Institute, Chicago. He succeeds **Alexander Konkle,** who has resigned to re-enter private business as treasurer of Arthur J. O'Leary & Son Co., Chicago, producer of iron

Sidney D. Williams

William B. Klee Jr.

Thomas F. Troxell

C. Walter Holmquist

and steel products. Mr. Terborgh formerly was senior economist, board of governors, Federal Reserve Bank, Washington. He will make his headquarters at the Washington office of the institute.

♦

Sidney D. Williams, vice president in charge of steel sales, Copperweld Steel Co., Glassport, Pa., has been made executive vice president in charge of the company's new steel division at Warren, O. **William B. Klee Jr.,** assistant secretary, has also been named assistant to Mr. Williams.

Thomas F. Troxell has been elected treasurer and a member of the board of directors. Mr. Troxell formerly was a partner of Riter & Co., New York investment banking firm. **C. Walter Holmquist,** heretofore general superintendent of the Glassport plant, has been promoted to vice president in charge of operations there. Company reports Warren and Glassport plants operating at full capacity.

♦

Charles A. Simmons Jr. has been elected vice president and general manager, Simmons Machine Tool Co., Albany, N. Y. Mr. Simmons, who is 25 and the son of **C. A. Simmons Sr.,** president, started work in the machine shops at the age of 16.

♦

Harry Merritt has resigned as vice president and manager, tractor department, Allis-Chalmers Mfg. Co., Milwaukee, but will continue in an advisory capacity. **W. A. Roberts,** since 1931 general sales manager, succeeds Mr. Merritt as manager of the tractor division.

♦

L. Bruce Grannis, of Chicago and Detroit, has been elected vice president in charge of sales, Anker-Holth Mfg. Co., Port Huron, Mich. **Leo T. Neidow,** also of Chicago, has been named vice president in charge of engineering and production. Mr. Grannis has been engaged as an industrial and organization engineer the past 25 years, and Mr. Neidow is the originator of the airgrip chucking devices now being manufactured by Anker-Holth.

♦

A. D. Troth, formerly manager of purchases, Sharon Steel Corp., Sharon, Pa., has been named director of purchases. **F. M. McCleery,** assistant purchasing agent, has become purchasing agent, while **Glenn R. McQuiston** has been made assistant purchasing agent.

♦

J. Earl Romer has been appointed district manager, Cleveland office, Bliss & Laughlin Inc., Harvey, Ill. He succeeds **A. W. Schultz,** resigned. Mr. Romer has been associated with Bliss & Laughlin five years, beginning in the Cincinnati sales area. The past three and a half years he has been identified with the Cleveland sales staff.

♦

M. J. Tennes Jr., president, Shafer Bearing Corp., Chicago, has entered active service as captain in the United States Army Air Corps, with permanent station at the Air Corps Advanced Flying School, Phoenix, Ariz. During absence of Capt. Tennes, management of the Shafer corporation will be under direction of **John F. Ditzell,** vice president and general manager.

♦

Edward Warner, purchasing agent, Doehler Die Casting Co., Toledo, O. has been elected president, Toledo Association of Purchasing Agents. Other officers: First vice president, **George Bancroft,** Willys-Overland Motors Inc.; second vice president, **L. C. Warrick,** Ottawa River Paper Co.; secretary-treasurer, **Walter Noe,** Libbey-Owens Glass Co., national director, **Gordon S. Yost,** Toledo Scale Co.

♦

G. R. Prout, since 1939 manager of sales, industrial control section, General Electric Co., Schenectady, N. Y., has been appointed manager of the industrial control division. **R. S. Glenn** has been named manager of sales of that division, assisting Mr. Prout.

W. C. Yates has been relieved of his present duties as manager of the control and renewal parts division, Industrial department, to devote more time to his duties as assistant manager of the department. **W. T. Darcy** will continue as manager of sales, renewal parts section.

♦

Paul G. Cheatham Jr., of F. I. Madero, No. 55, Mexico, D. F., has been appointed representative in Mexico for Iron & Steel Products Inc., Chicago.

♦

C. W. Pearsall has been appointed general sales manager, Ahlberg Bearing Co., Chicago. He joined the company in 1919 and was a salesman in Chicago and Philadelphia, then Philadelphia branch manager, later Chicago branch manager, and subsequently manager of distributor sales.

♦

Dr. Arthur S. Adams has been appointed assistant dean, College of Engineering, Cornell University. He joined Cornell a year ago, and has since been made professor of mechanics, secretary of the engineering experiment station and has been in charge of the engineering defense training program in Buffalo, Elmira, Binghamton, Geneva, and Ithaca, N. Y.

♦

Frank C. Neal Jr. has been named district arc welding specialist for General Electric Co.'s Dallas, Tex., office, and will cover Texas, Oklahoma and part of Louisiana. He succeeds **N. M. Voorhies,** who has been transferred to General Electric's Chicago office.

♦

Bertrand A. Landry has joined Battelle Memorial Institute, Columbus, O., and will be engaged in re-

search and development work in the division of fuels research. The past 18 years Mr. Landry has been associated with the United States Bureau of Mines.

♦

Thomas F. Peterson, since January, 1937, director of electric cable

Thomas F. Peterson

works, American Steel & Wire Co., Worcester, Mass., has been transferred to Cleveland as director of electric cable engineering and research. He joined American Steel & Wire in 1927 as cable engineer in the New York office; later was promoted to electrical engineer, and in 1931 was transferred to Worcester.

♦

Edward J. McCann, formerly superintendent, has been made general works manager, South Chester Tube Co., Chester, Pa. He has been

E. J. McCann

associated with the company 21 years, starting as night superintendent.

♦

W. C. Hale, formerly with the Gypsy division of Gulf Oil Corp., Tulsa, Okla., and more recently in the sales department of South Chester Tube, has been appointed assistant to general works manager.

♦

O. C. Mueller, heretofore sales representative in Cincinnati district for Mechanical Division, B. F. Goodrich Co., Akron, O., has been transferred to Pittsburgh, and is succeeded at Cincinnati by **A. C. Lutz. J. M. Cooney** has been transferred from Cincinnati to Dayton, O.; **B. E. Silver,** formerly with the manufacturers' sales department in Washington, has been transferred to the hose sales department at Akron, and **J. V. Powers,** sales correspondent in the New York district office, becomes field representative of the district, headquarters in Albany, N. Y.

♦

Col. Leonard P. Ayres, vice president, Cleveland Trust Co., and nationally known statistician, last week was nominated by President Roosevelt for temporary promotion to the rank of brigadier general. During the first World war, Colonel Ayres was chief statistical officer for the United States Army and has been acting in the same capacity in the present emergency.

♦

F. A. Stevenson was elected senior vice president, American Car & Foundry Co., New York, at its recent board of directors meeting. He will, however, continue in charge of operations. **W. L. Stancliffe,** formerly manager of miscellaneous sales, was elected vice president in charge of miscellaneous and munitions sales. All other officers were re-elected.

Week's Appointments In Defense Offices

WASHINGTON

■ Sam H. Husbands, a director of the Reconstruction Finance Corp., is new president of the Defense Plant Corp. John W. Snyder has been elected executive vice president of the Defense Plant Corp.

Dr. Reavis Cox, chairman of the marketing department, Wharton School of Finance and Commerce, University of Pennsylvania, has been appointed assistant director of the Civilian Supply Allocation Division, OPACS.

Nathaniel G. Burleigh, industrial engineer and former Dartmouth College professor, will establish and head a general products section.

J. Elmer Thomas, petroleum analyst of Ft. Worth, Tex., has been named an advisory consultant in the fuel section of OPACS.

A. D. Whiteside, who has been connected with OPM in various capacities, will be chief of the iron and steel section of OPM under the reorganization, it was reported unofficially last week.

DIED:

■ **George Herbert Jones,** 85, president, Hillside Fluor Spar Mines, Chicago; Midwest Forging & Mfg. Co., Pershing Quicksilver Co., and

George H. Jones

one of the founders and second president of Inland Steel Co., at his home in Chicago, July 6. Born in Brixton, England, and brought to Chicago as a boy, he began work as a clerk for Hall, Kimbark & Co., iron merchants. In 1893 he was one of the organizers of Inland Steel. After serving as its president eight years and in other executive positions he retired in 1921, but remained a director.

♦

Frank L. Coventry, 70, vice president, Cleveland Tool & Supply Co., Cleveland, July 4, in that city.

♦

Otto V. Kruse, 54, general sales manager, Baldwin Locomotive Works, Philadelphia, at his home in St. Davids, Pa., July 1.

♦

E. C. Edmundson, retired vice president and general manager, Williams & Co. Inc., Pittsburgh, July 1, in that city.

♦

William Oberhelman, 66, vice president, Hill & Griffith, Cincinnati, foundry supplies, June 28, in Birmingham, Ala., where he resided 42 years.

♦

Paul J. Simmen, 59, founder and president, Simmen Automatic Railway Switch & Signal Co., Eden, N. Y., July 1, in Eden.

♦

Lawrence McCarthy, 48, president, Hub Steel Co., Detroit, July 5, in that city. Born in Youngstown, O., Mr. McCarthy spent most of his life in Detroit, and was a former president of the Association of Steel Fabricators of Detroit.

MEETINGS

Prizes To Be Awarded at Welding Society's Convention

■ Summerill Tubing Co., Bridgeport, Pa., is establishing a series of prizes to be awarded by the American Welding Society at its annual meeting, Bellevue-Stratford hotel, Philadelphia, Oct. 19-24, for papers to advance the art of welding of aircraft steels, including tubing and other parts for tubular assemblies. Prizes of $300, $200, $100 and four of $25 will be awarded. More than 65 technical papers covering many phases of welding, cutting and treating processes will be presented.

Engineers To Discuss Machine Tools for Defense Purposes

To what extent older machine tools can be utilized to speed defense production is to be the major theme of the 3-day semiannual meeting of the American Society of Tool Engineers, Royal York hotel, Toronto, Oct. 16-18. Technical sessions will be devoted to a general consideration of machine tools for defense purposes, getting the most from cutting tools, and increasing machine production.

Canada Will Exhibit War Materials in Toronto

A large display of military, air force and naval equipment illustrating Canada's war effort will be available at the National Industrial Advertisers Association conference, Royal York hotel, Toronto, Sept. 17-19. It will include uniforms, shells, machine guns, aerial bombs, gun barrels and antitank guns.

Canada's Imports in May Valued at $128,096,000

OTTAWA, ONT.

■ Canada's total imports in May increased 27 per cent over the month last year, from $100,537,000 to $128,096,000, according to the Dominion Bureau of Statistics. United States was reported the main source of supply, with $84,428,000 against $63,896,000 in the month a year ago. United Kingdom was next, with $13,509,000, compared with $14,448,000 in May, 1940.

Iron and steel and their products were most important items. Rolling mill products totaled $5,470,000; engines and boilers, $2,865,000; farm implements, $4,265,000; machinery, other than agricultural, $12,583,000; vehicles, $6,877,000; electrical apparatus, $2,205,000.

■ W. Ames & Co., Jersey City, N. J., operating a relatively small warehouse and jobbing mill, have been granted permission to sell bars, angles and spikes at prices of $2.85, $3.10, and $3.45 per 100 pounds, respectively, or from 36 to 45 cents per 100 pounds above ceiling prices on equivalent products, by OPACS.

Gear Sales Index in June 299, Up 9.5%

■ Industrial gear sales in June were 9.5 per cent greater than in May, and 132 per cent above June, 1940, according to the American Gear Manufacturers Association, Wilkinsburg, Pa. Sales in the first six months this year were 125 per cent greater than in the corresponding period in 1940.

Comparative index figure of sales in June was 299, against 129 in the month last year. Index figure in May was 273; in April, 292; in March, 288, and 262 in February. The index is based on 1928 as 100.

Compilation, the association reports, applies only to industrial gears.

Steel Inventories Index Advances 2.3 Points

■ Index value of steel manufacturers' inventories in May was 125.6, compared with 123.3 in April and 113.6 in May last year, taking Dec. 31, 1938, at 100, according to the Commerce Department.

Index value of new orders received by steel mills in May was 302, compared with 304 in April and 145 in May, 1940. Index was based on 100 for January, 1939.

Department's figures show that, with January, 1939, as 100, the May index of steel mill shipments was 234. This compared with 215 in April and 133 in May last year.

There was an 11 per cent increase in value of steel mill unfilled orders in May, against the April increase over March of 14 per cent. Increase in unfilled orders in May, over the period in 1940, was 316 per cent.

Armco Works Establishes Three Production Records

■ Three production records were established in June by the American Rolling Mill Co.'s East Works, Middletown, O.

The open hearth department exceeded the previous monthly record by 1363 tons; the blooming, bar and strip mill rolled 1500 more tons than ever before; and the cold strip mill increased output by five feet per minute.

Total June output of the Armco plant, estimated company officials, is equivalent to a ribbon of steel four feet wide, as thick as a dime, reaching from New York to San Francisco and back to Denver.

Recommend Use of Silver Instead of Tin in Solder

■ Extensive substitution of silver for tin in solder to conserve and hasten accumulation of adequate tin reserves topped a list of measures recommended last week to the Office for Production Management by a committee of the National Academy of Sciences.

"By all-out substitution in every possible line, which would require construction of much special equipment, and at least temporary hardship, it is believed that at least three-quarters of the tin ordinarily used could be replaced," the group reported. "This means that the domestic smelting of Bolivian ores will supply most of the irreducible minimum."

Large-scale replacement of tin in solder, plus reduction in tin use already being made by can manufacturers, would reduce total tin consumption about 25 per cent, it was estimated. Sixty-six million ounces of silver annually should be sufficient for "all-out" replacement of tin in solder, said the committee. Forty to 50 pounds of tin may be replaced by 2½ to 5 pounds of silver, and at present prices the raw material cost of 2.5 per cent silver solder is "practically identical" with that of an equal volume of solder composed of 45 per cent tin and 55 per cent lead.

U.S. Steel's Shipments Decline 4.5 Per Cent

■ United States Steel Corp.'s shipments of finished steel in June were 1,668,637 net tons, a decrease of 76,658 tons, or 4.5 per cent, from the all-time monthly high of 1,745,295 tons in May. June shipments, however, established a new record for that month, the prior peak being 1,558,444 tons in June, 1917.

Shipments for six months totaled 10,052,877 tons, compared with 6,288,398 tons in the same period, 1940. This was a new high for first half, the prior record being 9,207,000 tons, in 1929.

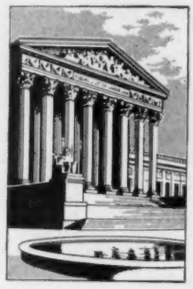
(Inter-company shipments not included)
Net Tons

	1941	1940	1939	1938
Jan.	1,682,454	1,145,592	870,866	570,264
Feb.	1,548,451	1,009,256	747,427	522,395
March	1,720,366	931,905	845,108	627,047
April	1,687,674	907,904	771,752	550,551
May	1,745,295	1,084,057	795,689	509,811
June	1,668,637	1,209,684	807,562	524,994
July	.....	1,296,887	745,364	484,611
Aug.	.....	1,455,604	885,636	615,521
Sept.	.....	1,392,838	1,086,683	635,645
Oct.	.....	1,572,408	1,345,855	730,312
Nov.	.....	1,425,352	1,406,205	749,328
Dec.	.....	1,544,623	1,443,969	765,868
Total, by Mos.	.....	14,976,110	11,752,116	7,286,347
Adjustment	.....	.....	*44,865	†29,159
Total	.....	.....	11,707,251	7,315,506

†Increase. *Decrease.

Windows of *WASHINGTON*

Alloy steel users asked to conserve scrap . . . Labor advisory committees to be appointed in reorganized OPM . . . Chromium placed under full priority control . . . Steel mill equipment for Brazilian project to get green light . . . Compliance section established to crack down on violators of priority regulations . . . Ceiling prices on rubber deferred . . . Steel sheets allocated for grain bins



By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

■ AMERICA is in a "tight spot" as regards alloy scrap and soon will be in an even tighter spot if effective conservation measures are not inaugurated. This warning was voiced by Charles H. Herty Jr., research engineer, Bethlehem Steel Co., and chairman of the alloy steel scrap conservation committee of the American Iron and steel Institute's defense committee.

His committee has decided to circularize consumers of alloy steels to find out how much scrap they have which is not going back into production. The committee also will investigate the best ways to get scrap back to steel producers and methods of preparing the scrap.

Mr. Herty was in Washington last week to confer with OPM officials on alloy scrap conservation.

Following the conference, H. L. Whitney, chief of OPM's alloy steel section, urged alloy steel users to segregate and identify their scrap in order that it may be returned to suppliers or scrap dealers free from contamination. Installation of salvaging machinery would be practical for many plants, he said, "since the premium prices obtainable for the nickel contents will compensate for the supervision and handling involved." Wright Aeronautical Corp., he stated, has installed a new system for conserving scrap at a cost of $130,000.

Biggest producer of nickel in the United States, said Mr. Whitney, is the scrap pile.

OPM plans monthly inventories of the scrap and recording of all transactions, both from scrap dealers and steel mills. American mills must conserve alloy scrap. He predicted the defense effort will be doubled during the coming year and the nickel situation accordingly tightened.

American Iron and Steel Institute's scrap conservation committee includes: Mr. Herty; Mr. Whitney; A. H. Philpot and R. H. Ridgeway, OPM; L. S. Bergen, Crucible Steel Co. of America; H. P. Rarsbach, Midvale Co.; D. H. Van Deusen and G. R. Kinzie of OPACS; James F. Reid, Timken Roller Bearing Co.; E. R. Johnson, W. M. Farnsworth and C. A. Ilgenfritz, Republic Steel Corp; B. H. DeLong, Carpenter Steel Co.; George F. Tegan, Rolling Mill Machinery and Equipment Association; Charles R. Miller Jr., United States Steel Corp.; L. D. Greuse, Bethlehem Steel Co.; W. F. Marks, Rustless Iron & Steel Co.

Eleven Members of Automotive Advisory Committee Appointed

Bureau of Defense Industry Advisory Committees of OPM has announced approval of 11 of the 19 members of the Automotive Defense Industry Advisory Committee, and the formation of a Motor Truck Subcommittee.

Members of the automotive committee represent the manufacturers of passenger cars, trucks, buses, taxicabs and fire-fighting equipment. The remaining eight members will be selected from representatives of manufacturers of parts and components.

Those approved: R. I. Roberge, Ford Motor Co.; Donaldson Brown, General Motors Corp.; B. E. Hutchinson, Chrysler Corp.; Paul Hoffman, Studebaker Corp.; George W. Mason, Nash-Kelvinator Corp.; Joseph W. Frazer, Willis Overland Motors Inc.; A. E. Barit, Hudson Motor Car Co.; W. F. McAfee, International Harvester Co.; E. J. Bush, Diamond T Motor Car Co.; R. F. Black, White Motor Co.; R. P. Page Jr., Autocar Co.

The following have been appointed to the Motor Truck Subcommittee: M. E. Coyle, Chevrolet Division, General Motors Corp.; L. D. Cosart, Dodge Chrysler Corp.; R. E. Burns, Ford Motor Co.; Charles T. Ruhf, Mack Mfg. Corp.; I. B. Babcock, Yellow Truck & Coach Mfg. Co.; E. J. Bush, Diamond T Motor Car Co.; W. F. McAfee, International Harvester Co.; Fred T. Macrae, White Motor Co.; T. R. Lippard, Federal Motor Truck Co.

OPM To Establish Defense Labor Advisory Committees

Defense Labor Advisory Committees corresponding to the Defense Industry Advisory Committees will be set up in the reorganized OPM.

The Labor Advisory Committees will consult with government representatives in the various commodity sections and advise them on those aspects of defense production which are of primary concern to labor, as the Industry Advisory Committees will consult and advise on matters of primary concern to management.

The general plan of organization already announced for the industry advisory committees will also apply to the labor advisory committees, and the twin objectives—those of unifying the working relationship of the several OPM divisions with the industries which they contact, and of efficient liaison between defense agencies and industry—are the same.

Brazilian Steel Mill Equipment Orders Given Priority Rating

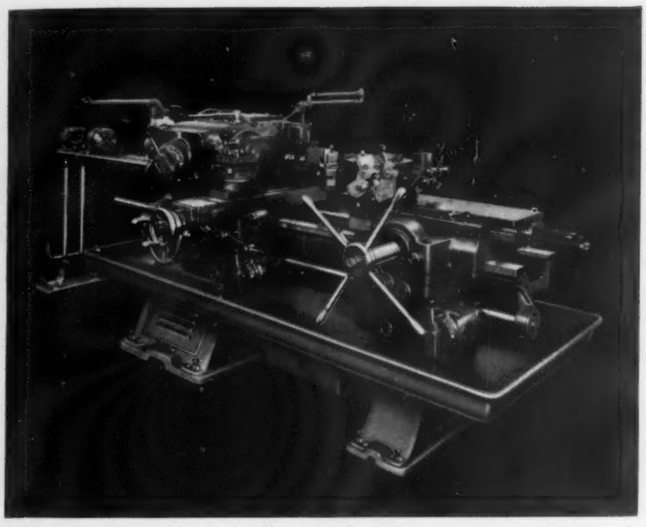
High priority ratings will be given to orders for machinery, equipment and steel placed in this country by the National Steel Co. of Brazil, which is erecting a $45,000,000 mill with Export-Import bank financing.

The OPM priorities division said the priorities will be sufficiently advanced to enable completion of the mill within two or three years.

"Urgency Standing" Granted For Vitally Needed Tools

Striking at the surplus of preference ratings that have produced a conflict among defense purchasers

Bumps ahead for the little fellow



No. 3 Jones & Lamson Ram Type Universal Turret Lathe with standard bar equipment.

Jones & Lamson equipment will help the small plant do the big jobs now and solve, also, the problems of the future.

APPLYING the "bits and pieces" principle to America's defense program promises to fill many a small plant to capacity — and beyond.

That's Bump No. 1.

If you operate a small plant and face the problem of adding new equipment, the question may come up: "Shall we install special machinery to handle defense work?" When normal conditions return, most special equipment can only be junked and written off your books.

That would be Bump No. 2 — and a rough one.

Then you would face the problem of equipping to meet the driving competition of a post-war world.

That would be Bump No. 3 — and the stiffest jolt of all.

Plan now to smooth out these bumps and keep up your profits. See what versatile, long-lived, high speed, standard Jones & Lamson machine tools can do to help you fill your armament orders promptly and leave you in position to win and hold post-war business later. Who knows what type of products you will find it most advantageous to produce and sell after this crisis is over? Only the most flexible modern equipment will leave you in position to meet demands which no one today can foresee.

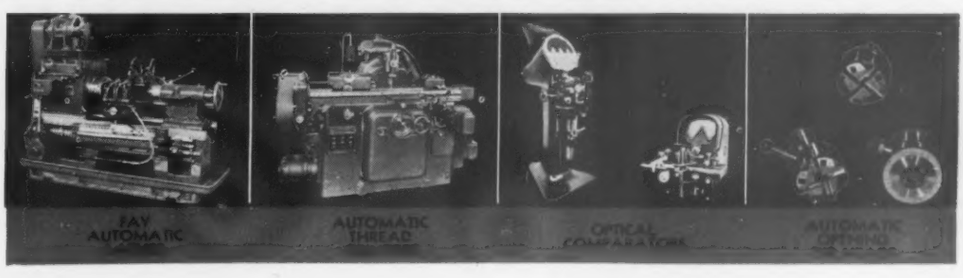
It will not obligate you to put your problems up to Jones & Lamson engineers. Inquiries from small plants receive prompt attention here, and we may be able to help you over many of the bumps before you reach them.

PROFIT PRODUCING
MACHINE TOOLS

JONES & LAMSON MACHINE CO.

Springfield, Vermont, U. S. A.

Manufacturers of: Ram & Saddle Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Thread Grinding Machines . . . Comparators . . . Automatic Opening Threading Dies and Chasers.



of machine tools, the OPM Priorities Division last week adopted a regulation formula giving tool buyers an "urgency standing." Priorities Director Stettinius said the formula will enable manufacturers to fill orders considered more vital although they carry the same rating as less urgent orders.

A major part of the formula is a master preference numerical list consisting of defense contractors who have ratings for tools and their relative "urgency standing." Purchasers on the list are to have priority over other with the exception of makers of machine tools, cranes, cutting tools, gages, micrometers and chucks who have an A-1-a rating.

Mr. Stettinius said this will give the machine tool industry the tools it needs to continue production.

British orders, some of which lack preference rating high enough to assure delivery when needed, will be "frozen" at their present status.

The formula provides a period of grace ranging from 30 to 60 days to allow manufacturers who receive the new high-rating orders for tools to adjust their schedules.

15,000 Tons Sheets Set Aside To Build Steel Grain Bins

Aid for farmers facing a shortage of storage space for grain now being harvested has been provided in an OPACS order providing for emergency preference ratings on 15,000 tons of sheet steel to be used in construction of grain bins.

Program provides that emergency preference ratings effective for obtaining such material shall be issued to the extent determined by the OPM to be consistent with the defense program.

Chromium Placed Under Full Priority Control

Chromium last week was added to the critical materials placed under full priority control by Priorities Director Stettinius. The metal is vital to defense, being required for hardening steel, for production of high-speed cutting tools, for the manufacture of refractory brick and for many chemical uses.

The United States is dependent almost wholly on imports for its supplies of chromite ore. The government stockpile is not large enough, consumption is moving up, and the increasing pressure on shipping space may restrict imports in future months.

The order provides all defense orders carry a preference rating of A-10 unless higher ratings are specifically assigned; monthly deliveries of chromium for use in the manufacture of chemical products must be limited to the average monthly consumption of the processor over the 12-month period July 1, 1940, to June 30, 1941; deliveries by processors of chromium for refractory material can be made only under defense orders or for necessary maintenance and repairs, except when the director of priorities provides otherwise; after the satisfaction of defense orders and all other terms of the order, deliveries for nondefense purposes may be made; restrictions against the building up of excessive inventory.

Consumption of chromite ore in this country at the present time is at the rate of between 750,000 and 800,000 long tons

Chromium is the fifteenth material put under full priority control.

Ceiling Prices on Rubber Goods Deferred by OPACS

Setting of ceiling prices on finished rubber products, in particular, tires and tubes, will be deferred for some months, OPACS Administrator Henderson announced last week. Effect will be to give the industry an opportunity to work out the current price problem on a voluntary basis.

Decision was reached after a series of conferences with tire manufacturers, mass distributors, and dealers.

OPACS previously had announced a ceiling would be placed on tire and tube prices at June 16 levels, a date prior to the announcement of the reduction in rubber consumption.

General Steel Preference Delivery Order No. 1 Forms Are Revised

Revision of forms PD-32 and PD-32a, used in connection with General Steel Preference Delivery Order No. 1, has been announced.

Revised forms, especially PD-32, are more detailed than the previous ones.

Customers of producers of iron and steel products, if unable to place an order satisfactorily, or if their orders are unduly delayed, may bring the matter to the attention of the Priorities Division by filling out form PD-32.

If the Priorities Division feels that the case justifies such action, it will then send the producer involved form PD-32a, requiring the producer to fill out another form, explaining why the customer's order was delayed or rejected.

Mass Transportation Equipment Materials Granted Priority

To insure adequate public transportation facilities, the OPACS through its Civilian Supply Allocation Division has issued a program providing preferential status on deliveries of materials and equipment used in construction of cars and buses for urban or interurban lines.

A serious shortage of these types of passenger transportation equipment exists. It was decided to alleviate the situation by placing coaches and rail-cars used on urban and interurban lines on an equal footing as to materials and equipment with freight cars and locomotives, for which allocation programs already have been prepared.

The new program provides that deliveries of material and equipment necessary for the construction of motor and electric coaches and rail-cars for city, suburban and intercity common carrier passenger transportation shall be given preference over all material and equipment going to any other civilian uses, subject only to a prior preference to deliveries for all such material and equipment as may be required under contracts with the United States or any department or agency thereof.

OPM Priorities Division Sets Up Compliance Section

Compliance section, charged with investigating and correcting violations of priority regulations has been established with the Priorities Division of OPM. Lawrence J. Martin, administrator of General Metals Order No. 1 is in charge.

In announcing the new section, Priorities Director Stettinius declared that all efforts will be made to obtain voluntary compliance in all cases, but punitive action can and will be taken if necessary, so that the great majority of producers, who co-operate freely and willingly, will not be penalized by the unfair activities of a few who refuse to co-operate.

In the event that efforts to obtain voluntary co-operation fail, action which may be taken includes:

1. Public statements as to violations or evasions which have taken place.

2. The restriction of supplies of critical materials until compliance is assured.

3. Court action to require compliance.

The compliance section will control and supervise compliance cases arising through complaints from within OPM, from within the armed services, and from industry and the public.

Within the Washington office of the Priorities Division, all complaints of noncompliance with orders or certificates will be referred to the compliance section and will thereafter be handled under its supervision. Provision will be made for consultation and advice with industry groups and committees.

National Steel To Add 300,000 Tons Ingot Capacity at Detroit Plants

■ THREE hundred thousand net tons of ingot capacity will be added by National Steel Corp., Pittsburgh, by an expansion program at the company's Detroit unit, Great Lakes Steel Corp., announced last week by E. T. Weir, chairman.

The new program, like construction that has been underway since the first of the year at three plants of National Steel Corp., has been undertaken, Mr. Weir said, to help meet the greatly increased needs for steel that have been created by the defense program. He added that the major portion of National Steel Corp.'s entire output is now being applied in defense production.

Primary steel capacity being added by construction now in progress plus that of the new program just announced, will produce a total increase of 750,000 net tons per year in the company's ingot production, which is an increase of approximately 21 per cent over capacity at the end of 1940.

Principal features of the new program at the plants of Great Lakes Steel Corp. will be the installation of a bessemer converter and expansion of open hearth furnace capacity. Pig iron production will be sufficient to supply all requirements of the new steelmaking facilities.

Also now underway at Great Lakes Steel is the project to adapt the company's 96-inch continuous hot mill for the annual production of from 300,000 to 350,000 net tons of steel plates.

Requirements of the defense program and the general speed-up of industrial activity created sudden heavy demands for steel plates in excess of the country's normal plate capacity. Projects that are being undertaken by National Steel, as well as other steel companies, to adapt continuous mills to the rolling of steel plates assure an ample supply of this product, Mr. Weir said.

Program now in progress at National Steel's plants, which will be largely completed this year, includes construction of 45 new by-product coke ovens and the building and enlargement of blast furnace capacity to add more than 600,000 net tons per year to pig iron production.

Zinc Supplies Decline 5 Per Cent in Month

■ Consumers' stocks of slab zinc declined nearly 5 per cent in May, compared with declines of 8 per cent in April and 4 per cent in March, according to the Bureau of Mines. Stocks May 31 were 56,489 tons, compared with 59,414 tons April 30.

Inventories held by all classes of users except brass mills and zinc rolling mills and oxide plants fell in May. Those at brass mills continued the April increase and were 7 per cent higher at the end of May; stocks at zinc rolling mills and oxide plants increased 1 per cent. Galvanizers' stocks declined 12 per cent, and those of die casters 7½ per cent.

Stocks of all grades dropped in May; the decline of brass special, selected, and prime western inventories amounted to 7½ per cent, and special high grade 4 per cent; stocks of regular high grade and intermediate declined only a few tons or considerably less than 1 per cent.

The total stock for May 31 was distributed as follows: Special high grade, 22 per cent (22 per cent in April); regular high grade and intermediate, 25 per cent (24 per cent in April); all other grades, 53 per cent (54 per cent in April). Galvanizers held 46 per cent of the total stocks on May 31 (50 per cent on April 30), brass mills 30 per cent (26 per cent on April 30), and die casters 11 per cent (12 per cent on April 30).

Tin Output and Stocks Increased in May

■ World tin production in May is estimated at 22,200 gross tons, compared with 17,100 tons in April, according to International Tin Research & Development Council, Greenford, Eng. Production in the first five months totaled 96,000 tons, against 85,400 tons in the period in 1940.

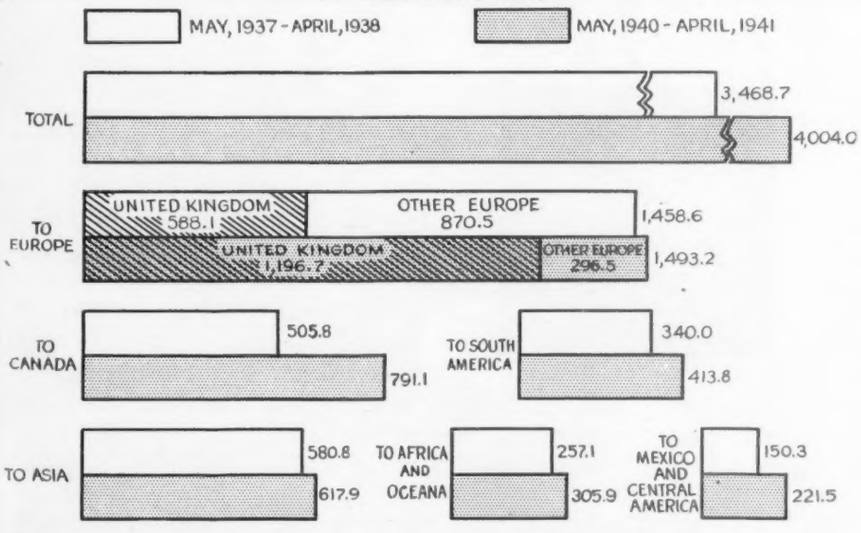
United States deliveries were 10,490 tons in May, compared with 13,955 tons in April. For five months deliveries were 65,492 tons, in contrast with 41,384 tons in the corresponding portion of 1940. Consumption of tin in the United Kingdom for the first four months of 1941 was 9509 tons, little changed from 9695 tons in the same months in 1940.

World stocks, including smelters' stocks and carryover, increased by 3693 tons during May, to 57,140 tons at the end of the month. Stocks at the close of May, 1940, were 40,738 tons.

■ Forty-five chief machinist's mates and machinist's mates first and second class will study operation and maintenance of air conditioning and refrigeration equipment at a special training school at York Ice Machinery Corp., York, Pa., this summer and fall. The navy men will report in groups of 15 each for six weeks' courses, the first of which started July 7.

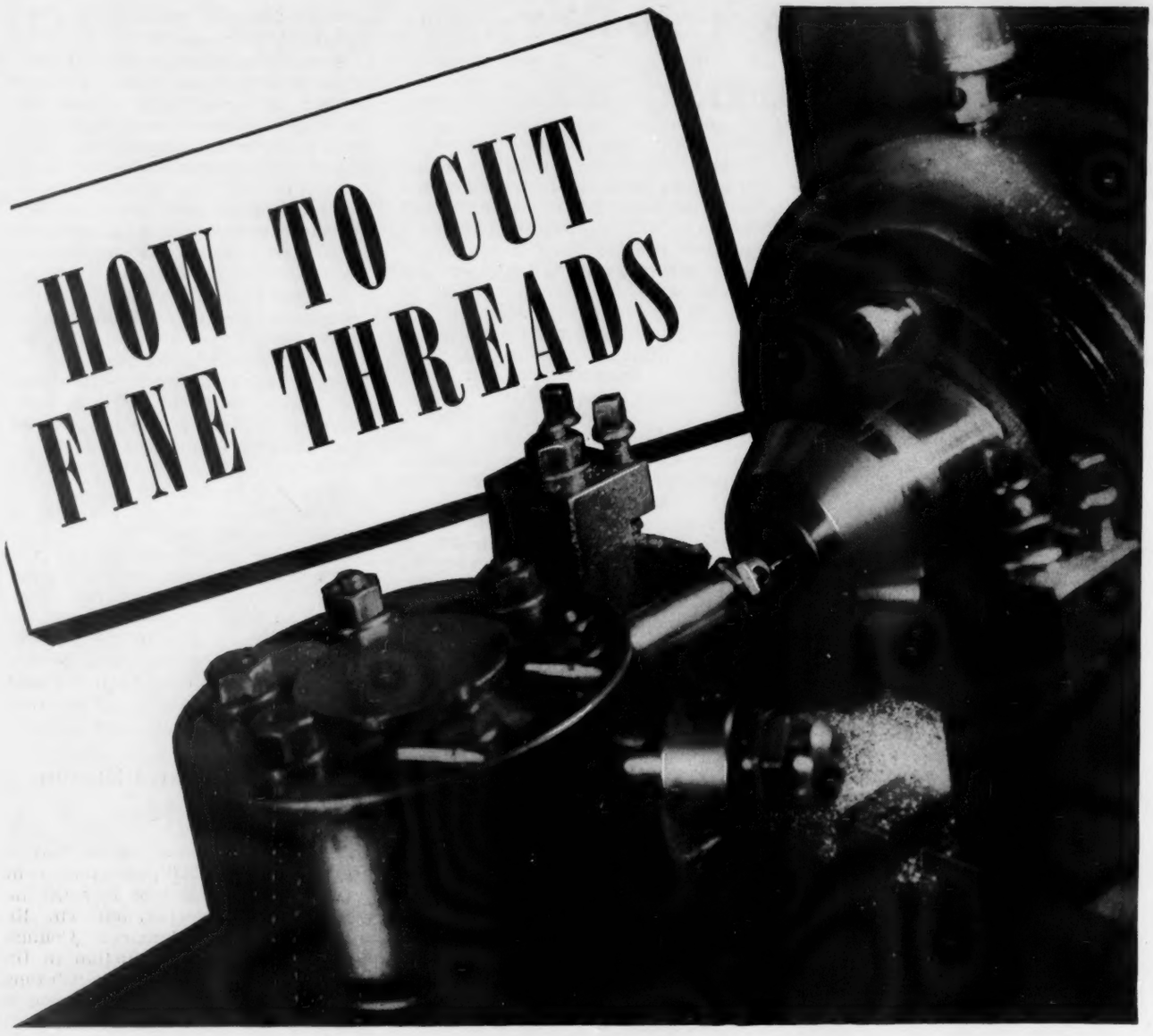
United States Exports Increase Despite War

(In millions of dollars)

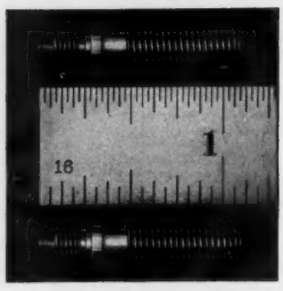


■ Despite changes in destination and nature of American exports due to war conditions abroad, the total for the year ended April, 1941, exceeded that for the year ended April, 1938, before the outbreak of hostilities, by 15.4 per cent. Exports to the United Kingdom increased 103.5 per cent. Practically every principal geographic area took additional products in the past year. Chart compiled by National Industrial Conference Board from Bureau of Foreign and Domestic Commerce data

HOW TO CUT FINE THREADS



LOOK at this brass stud—used for mounting instrument magnets. After being formed and the long end threaded on an automatic screw machine, the two threads on the short end are cut on a No. 1 W & S Turret Lathe—speed 1200 R.P.M. The larger thread is .112″-40, the smaller one only .057″-104.



The manufacturer, one of the largest concerns in the country, finds High Speed Steel "*Acorn*" Dies the best solution for this job.

"*Acorn*" Dies, because of their accuracy and their positive, finely controlled adjustment, are the ideal tools for cutting fine threads. Originally invented and manufactured by "G.T.D. Greenfield," they are typical of the contributions to modern manufacturing methods that have made "G.T.D. Greenfield" the country's leading and largest manufacturer of screw threading tools. Our complete catalog will be sent gladly on request.

GTD GREENFIELD

TAPS · DIES · GAGES · TWIST DRILLS · REAMERS · SCREW PLATES · PIPE TOOLS

GREENFIELD TAP & DIE CORPORATION
GREENFIELD, MASSACHUSETTS
DETROIT PLANT: 2102 West Fort St.
WAREHOUSES in New York, Chicago and Los Angeles
In Canada:
GREENFIELD TAP & DIE CORP. OF CANADA, LTD., GALT, ONT.

Mirrors of *MOTORDOM*

Roughened crankpin and main bearing journals found to result in longer bearing life, upsetting previous concepts of surface finish. Dynamometer and road tests confirm early results, so production shafts now are being lapped only 5 minutes instead of 48 . . . New models will startle public with sweeping changes in body lines . . . Shotblast connecting rods to improve fatigue life

By A. H. ALLEN
Detroit Editor, STEEL

DETROIT

■ A REVOLUTIONARY upheaval in popular conceptions of the most desirable type of surface finish on steel parts subject to lubricated metal-to-metal contact is in the offing, if early investigational work by engineers of a large automobile company continues to look as promising as it does now. Specifically the matter of finish on crankpins and main bearing journals has been studied, but similar conclusions would seem to apply to other parts such as wristpins, valves, tappets, pistons, cylinder walls and the like.

Established practice has been to machine, grind and lap crankpins to a virtual "mirror" finish or, as measured by the profilometer, with average depth of surface depressions something like 4 or 5 microinches (millionths of an inch). Chrysler's Superfinish method goes even further, down to 1.5 or 2 microinches. The theory behind the ultrasmooth finish is that in operation a complete and unbroken film of oil is formed on the steel which carries the load on the bearing journal and prevents metal-to-metal contact and failure of the bearing.

Roughened Journals Better

Artificial roughening of smooth steel surfaces has been practiced on such parts as camshafts, pistons and tappets for the purpose of etching the surface and applying a soft coating material which would have a wick action and absorb oil so that initial scuffing of moving metal surfaces is minimized. Electrolytic, chemical and heat treatments have been used successfully in such applications.

In the research mentioned above, after it was proved that acid etched journals gave longer bearing life than smooth journals, it was decided to build some crankshafts in which the journals would have different degrees of roughness produced mechanically. Four journals on a test shaft were ground with a nonglazed free-cutting wheel which gave deeper pits than the usual ground finish showed. After grinding, the journals were polished only lightly with abrasive cloth. The shaft then was assembled in a motor and given a low-speed endurance run on a dynamometer, involving five cycles of 12 hours at 2800 r.p.m. and 1 hour at 4200 r.p.m., three cycles under full load and two under three-quarter load. After tearing down the motor it was discovered that the rod bearings on the rough journals were in much better shape than those on the smooth journals. This mystifying discovery was checked by varying the position of the rough journals on the shaft, but the conclusions were the same in every test.

Next step was to make up a series of seven crankpin sections and finish them to varying degrees of smoothness, ranging from the "production" or smooth finish to the rough ground finish before polish. Three sets of these specimens were checked by profilometer and average readings were as follows, in microinches: 5.0-6.5, 21-33, 35-49, 68-83, 88-98, 99-110 and 105-115. Incidentally the shaft is S.A.E. 1045 steel, heat treated.

More endurance runs established a tentative roughness range of 35-50 microinches as the optimum, this before any maximum limit on roughness had been ascertained. So additional test shafts were made with even rougher journals. Dynamometer and road tests showed that the No. 5 finish, 88-98 microinches, was even better than the tentative standard.

So convincing and uniform were all tests that it was decided to specify the range of 35-50 microinches as the production standard for all crankshaft journals, both pins and mains. Then the problem was how to convince shop inspectors and machine operators that a shaft they formerly would have rejected without a second glance because of rough journals actually was a better one than the old mirror-smooth shaft! Inspectors had to throw out all their preconceived ideas of journal finishes and "start from scratch," so to speak.

Now, with bearing loads shortly to be increased appreciably because of a change from aluminum to cast iron pistons, the latter weighing 75 per cent more than aluminum, attention is focused more sharply than ever on the matter of bearing life. Hence it is proposed to step up journal roughness even more, perhaps in the range of 40 to 70 microinches.

Principal Changes Involved

There is no trick to doing this in the shop, and no new equipment is required. Three principal changes are involved: First, grinding wheels are dressed with fast traverse of the dresser and no fadeout of the dressing action, and are dressed after every 20 pins instead of after every 10 pins as before; second, the grinding wheel is withdrawn as soon as size is reached instead of waiting until sparks fade out; and third, the journals are machine lapped only 5 to 10 seconds with No. 240 grit cloth, instead of the former practice of lapping 30 seconds with No. 240 and 18 seconds with No. 320.

The obvious question is why a roughened bearing journal should now prove to be easier on bearings than what has always been thought necessary. In answer to this, it must be pointed out that no definite conclusions or theories can be cited at this stage. It is too early. A thorough and leisurely program of fundamental research is indicated before any definite statements can

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be made as to the whys and wherefores.

However, for anyone who is interested in a possible analysis, here is one which has been suggested: If the theoretically continuous oil film on the journal should be ruptured or dispersed by deflection of the shaft or variation in the load or some other reason, then a series of small drops of oil, trapped in the grinding "valleys" in the shaft might be dragged out between the shaft and bearing to constitute many load-carrying wedges of oil on the so-called "plateau" of the normal journal surface, thereby preventing metal-to-metal contact which puts an end to bearing life.

The gentle lapping action may be considered to remove the "peaks" of grinding tracks, metal which is perhaps hardened, burned, or torn, leaving runners or grooves, very small naturally, to entrap oil which under load could provide a sort of pressure lubrication. It is not possible to operate a rough ground or even a finish ground bearing journal satisfactorily principally because the peaks previously referred to would cut the bearing to pieces, resulting in a sloppy fit.

Engine builders generally in recent years have reduced sharply the thickness of the babbitt layer on connecting rod bearings, many being only one-third of the thickness previously specified. This has brought increased bearing life and strength and has suggested to some bearing engineers that it might be well to try even thinner babbitt layers. One serious objection has been heard. If you get the babbitt too thin, it becomes almost impossible to detect a burned-out bearing, particularly in buses and trucks where the general noise level is high. And if you do not catch a failed bearing quickly there is the danger that the rod will seize to the shaft, break and go through the side of the crankcase. So there is an inclination to go easy on any further reduction of babbitt thicknesses.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1939	1940	1941
Jan.	356,962	449,492	524,058
Feb.	317,520	422,225	509,326
March	389,499	440,232	533,849
April	354,266	452,433	489,854
May	313,248	412,492	545,321
5 mos.	1,731,495	2,176,874	2,602,408
June	324,253	362,566	.....
July	218,600	246,171	.....
Aug.	103,343	89,866	.....
Sept.	192,679	284,583	.....
Oct.	324,689	514,374	.....
Nov.	368,541	510,973	.....
Dec.	469,118	506,931	.....
Year	3,732,718	4,692,338	.....

Estimated by Ward's Reports

Week ended:	1941	1940†
June 21	133,565	90,060
June 28	127,926	87,550
July 5	96,457	51,975
July 12	114,318	62,176

†Comparable week.

Radically New Styling in Some 1942 Bodies

If anyone thinks that 1942 models are going to be a pretty sad looking lot of automobiles, he had better change mind right now. Observers here who have been privileged to take an early peek at some of them are uniform in their praise of what the industry has accomplished, particularly with regard to bodies and outward appearance. Entirely new bodies will appear on several lines, sharply different from anything now on the market. No interference with the defense program was occasioned by these changes, because at the time body dies were going through, there was nothing else in readiness for the tool and die shops to tackle.

A few generalities on the 1942 models will indicate trends: Longer wheelbases, bringing easier riding, particularly in rear seats; heavier bumpers extending around front and rear corners to protect exposed fenders; blending of both front and rear fender contours into body lines comparable to what Cadillac and Packard already have done; wider hoods and lower roofs; no great reduction in bright metal moldings, grilles and other decorative touches.

Mechanical changes will be subdued in the interest of new body contours. As indicated here previously, there will be more fluid flywheels or clutches.

Improve Rods, Change Pistons

An interesting new development in connecting rods is the idea of shot-blasting them all over, resulting in a 125 per cent increase in fatigue life. Either hard or normalized shot appears suitable for this treatment, although important savings can be realized from the use of the normalized shot from the standpoint of equipment maintenance. Allison is understood to be using this treatment on rods for its airplane engines.

Foundrymen from near and far have been inspecting the new cast iron piston department in the Buick foundry at Flint where, with comparatively little dislocation of equipment or other jobs, facilities have been set up for casting 16,000 dome-top pistons in an 8-hour trick.

New Die Casting Alloy

Die casters supplying the motor industry have been having more than their share of troubles, it appears. Although they have been able to obtain reasonable amounts of high-purity zinc for casting, they have to have 3 per cent of aluminum for hardener in the die-casting alloy. With the shutting off of all aluminum except on A-10 priority or better, it looked like no aluminum for die castings. Metallurgists now have developed a zinc alloy with only 1.5 per cent of aluminum and increased copper content, and die casters are hopeful of getting at least half the aluminum they formerly needed for alloying.

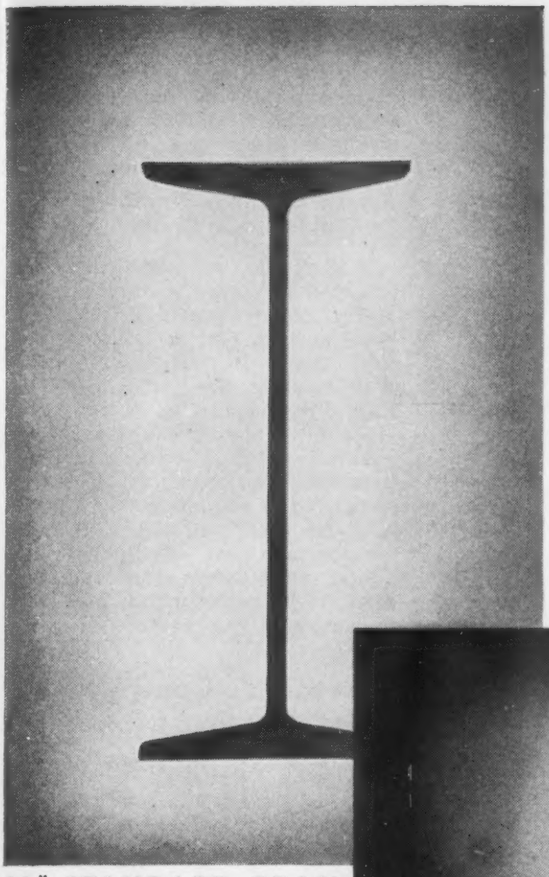
Studebaker Building 6-Wheel Army Trucks

■ First of many thousand Studebaker army trucks ordered by the War Department recently was completed at the company's plant in South Bend, Ind. They are 6-wheel drive cargo vehicles of 2½-ton capacity

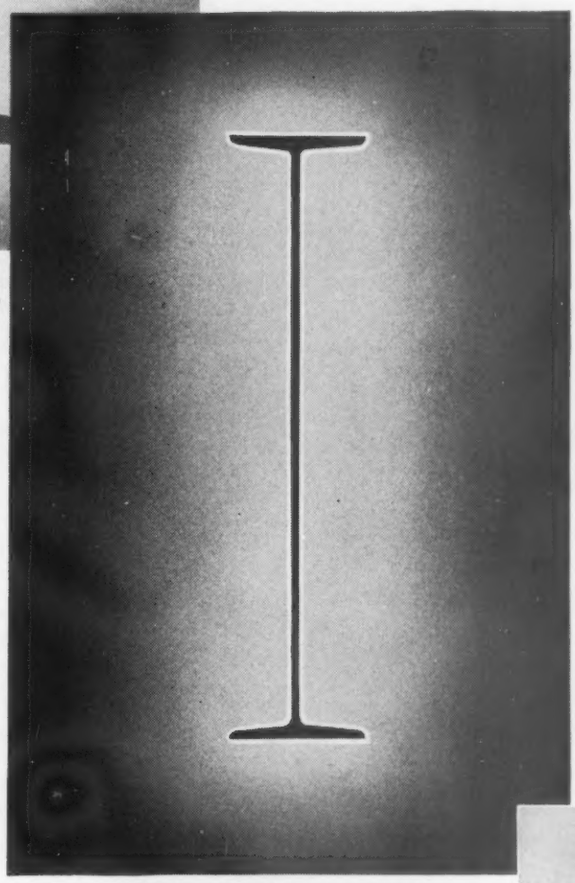
CONTROLLED QUALITY

JUNIOR BEAMS

—strong, lightest-weight steel I-sections rolled—reduce dead weight as roof and floor members in many types of structures.



10″ STANDARD BEAM
25.4 POUNDS PER FOOT



10″ JUNIOR BEAM
9 POUNDS PER FOOT

J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION

AMERICAN IRON & STEEL WORKS • PITTSBURGH, PENNSYLVANIA

Letters of Intent for Machine Tools Issued

■ Letters of intent for machine tools and equipment totaling $34,908,225 were issued to 32 companies recently by the War Department. It is estimated the orders will be spread among more than 25,000 subcontractors.

One contractor, it is reported, has already awarded more than 100 subcontracts, and some subcontractors are said to have placed further orders to as many as ten smaller plants. Equipment is for small arms ammunition plants at St. Paul; Des Moines, Iowa; and Salt Lake City, Utah. Letters were given to:

Peters Engineering Co., Philadelphia, $1,452,250.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., $6,971,758.
Ferracute Machine Co., Bridgeton, N. J., $1,519,813.
Zeh & Hahnemann Co., Newark, N. J., $193,050.
Globe Machine & Stamping Co., Cleveland, $11,374.
Standard Machinery Co., Providence, R. I., $35,878.
Carrier Corp., New York, $11,098.
Hires, Castner & Harris, Philadelphia, $579,967.
Blakeslee, G. S., & Co., Cicero, Ill., $119,889.
Colt Patent Fire Arms Mfg. Co., Hartford, Conn., $426,188.
Lindberg Engineering Co., Chicago, $73,597.
Owens Illinois Glass Co., Toledo, O., $429,282.
Specialty Engineering Co., Philadelphia, $2696.
Black Rock Mfg. Co., Bridgeport, Conn., $192,450.
Canister Co., Phillipsburg, Pa., $176,537.
Inman Mfg. Co., Amsterdam, N. Y., $204,105.
Proctor & Schwartz, Philadelphia, $128,700.
Bliss, E. W., Co., Brooklyn, N. Y., $11,126,877.
Star Tool & Die Co., Detroit, $1,161,500.
Spayd-Ohio Mfg. Co., Detroit, $944,300.
Manistee Iron Works, Detroit, $1,145,340.
Heidrich Tool & Die Corp., Detroit, $597,090.
Ranschoff, N., Co., Cincinnati, $142,770.
Manville, E. J., Machine Co., Waterbury, Conn., $372,972.
Modern Bond Corp., Wilmington, Del., $214,994.
V. & O. Press Co., Hudson, N. Y., $2,044,456.
Du Pont, E. I., de Nemours & Co., Wilmington, Del., $64,517.
Fidelity Machine Co., Philadelphia, $471,273.
Henry & Wright Mfg. Co., Hartford, Conn., $1,233,836.
Salem Engineering Co., Salem, O., $2,012,177.
Schutte & Koerting Co., Philadelphia, $534,189.
Watson Stillman Co., Roselle, N. J., $313,302.

Replans Freight Cars, Saves Aluminum, Nickel

■ Complete replanning of 1941 car orders of Pullman-Standard Car Mfg. Co., New York, has enabled the company to save 3,350,000 pounds of aluminum and 180,000 pounds of nickel for the national defense program. A company spokesman pointed out the aluminum conserved would be sufficient to build 670 pursuit planes or 180 medium bombers.

In place of aluminum, Pullman-Standard will use steel where strength is a prime requisite; plastics, composition board and similar materials will be used in interiors and in applications where great strength is not needed.

Elimination of chrome nickel stainless and the substitution of other types of steel will effect the nickel savings.

American Car & Foundry To Weld Freight Cars

High-speed welding equipment designed for large scale production of freight cars has been developed by American Car & Foundry Co., New York, in co-operation with Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., and Federal Machine & Welder Co., Warren, O.

Each car is held together by more than 6000 spot welds, which can be completed in one and one-half hours with the new apparatus. The process permits use of thinner and lighter steel sheets and results in more rigid construction, according to company engineers.

Weirton To Comply, With Two Exceptions

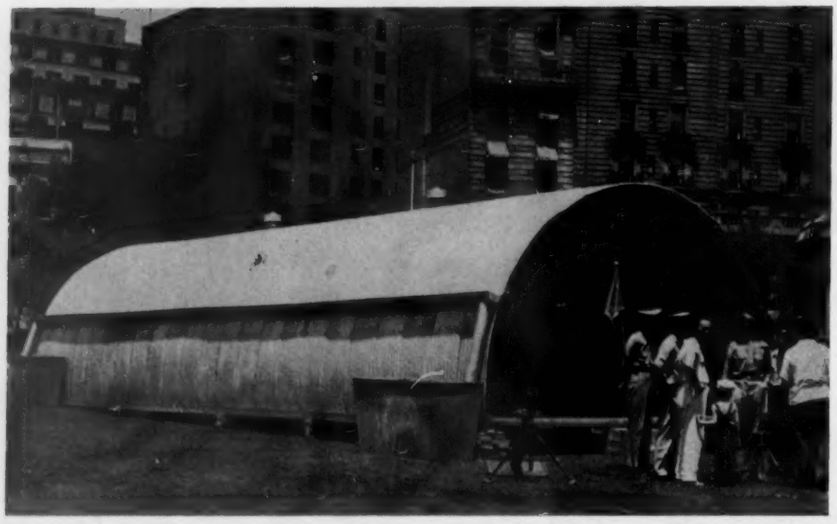
■ Weirton Steel Co., Weirton, W. Va., last week announced it will comply with the National Labor Relations Board's recent order against it (STEEL, June 30, p. 16), with two exceptions: No back pay will be offered to 17 men who claimed they were discriminatorily discharged, nor will re-employment be offered to six of these.

T. E. Millsop, president, said that of the 17 men ordered reinstated one is dead, two recently served jail sentences for violating election laws by signing Communist petitions, and re-employment of three will be held in abeyance until a decision is made by the War Department as to whether they can be employed on defense work.

"We are offering employment to the remainder of the 17 men, not because we feel they have any legal right to it but because of our consistent position since the time of their so-called eviction from the mills that they were never discharged. Inasmuch as the 17 men were never discharged, there will be no offer of back pay to any of them. It is not a question of money involved, as most of these men have been working elsewhere and the back wages would not amount to much, but we feel that we would be compromising with principle if we paid them any money simply to avoid further litigation."

■ Orders received by General Electric Co., Schenectady, N. Y., during the first six months this year totaled $521,139,000, compared with $212,653,000 for the same period in 1940. First half orders established a new record.

Steel Shelter Erected in Nine Hours



■ **Corrugated steel tropic shelter which can be erected in nine hours is demonstrated by United States Marines at Washington. The hut can be covered with dirt or sandbags as camouflage and protection from shell splinters. NEA photo**

Heavy Taxes Feature Financial Analysis of 165 Companies

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YEAR (For 165 Companies Listed Below)	Total Assets	Total Number of Common Shares	Total Number of Common Stockholders	Total Number of Employes (Average for Year)	Total Taxes (All Kinds)	Total Net Earnings (After Taxes)	Total Common Dividends	AVERAGE PER COMPANY: % of Taxes to Net Earnings (Before Taxes)	Taxes per Common Share	Dividends per Common Share	Taxes per Common Stockholder	Taxes per Employe
1940	$44,974,942,130	653,815,300	5,686,629	3,490,601	$2,565,356,532	$2,022,987,658	$1,247,356,732	55.9%	$3.92	$1.91	$451	$735
1939	43,749,555,750	648,386,312	5,592,562	3,237,475	1,979,837,898	1,721,354,505	1,076,966,487	53.5%	3.05	1.66	354	612
Increase for 1940	$ 1,225,386,380	5,428,988	94,127	253,126	$ 585,518,634	$ 301,633,153	$ 170,390,245	NOTE: Excess profits tax for 1940, reported by only 73 of the companies listed below, amounted to $153,488,139.				
Per Cent of Increase in 1940 over 1939....					29.6%	17.5%						

[For fiscal year 1940]

Name of Company	Total Assets	Total Capital Stock Outstanding (Com. & Pfd.)	Total Shares Outstanding (Com. & Pfd.)	Total Number Stockholders (Com. & Pfd.)	Number of Employes (1940 aver.)	1940 Total Taxes (All Kinds)	1940 Net Income (After Taxes)	Per Cent of Taxes to Net Earnings before Taxes	1940 Taxes per Common Share	1940 Dividends Paid per Common Share	1940 Taxes per Common Stockholder	1940 Taxes per Employe
Acme Steel Company	$ 16,883,546	$ 8,202,700	328,108	3,650	2,761	$ 1,751,856	$ 2,110,432	45.4	$ 5.34	$3.00	$ 480	$ 635
Air Reduction Company, Inc.	39,930,528	27,955,791	2,711,137	14,945	4,389	3,609,850	6,446,680	35.9	1.33	1.75	242	822
Allegheny Ludlum Steel Corp.	37,891,386	11,198,362	1,290,348	10,443	9,500	3,799,608	3,722,107	50.5	3.02	1.50	376	400
Allis-Chalmers Mfg. Co.	114,031,786	54,965,044	1,776,092	18,600	15,030	5,160,826	5,051,444	50.5	2.91	1.50	277	343
American Can Company	198,432,985	103,083,250	2,886,331	34,890	22,523	11,916,359	17,440,906	40.6	4.82	4.00	413	529
American Cyanamid Company	86,417,609	34,732,254	3,473,225	21,500	11,800	4,741,571	6,395,666	42.6	1.81	2.10①	249	402
Amer. Radiator & S.S. Corp.	115,301,025	74,690,697	10,087,335	53,501	19,800▲	5,102,000	7,349,011	41.0	0.51	0.40	97	258
American Rolling Mill Co.	157,021,944	116,739,009	3,318,637	43,221	17,077	4,734,425	7,642,714	38.3	1.65	0.25	141	277
American Smelt. & Ref. Co.	170,903,150	93,620,430	2,691,669	29,264	28,765	9,900,000	12,735,205	43.7	4.52	2.75	461	344
American Steel Foundries	36,528,761	23,749,920	1,187,496	11,305	5,697	1,853,630	2,943,534	38.6	1.56	1.50	164	325
American Tel. & Tel. Co.	5,484,988,929	1,992,385,071	19,923,976	688,299	272,068	187,598,702①	210,497,453	47.1	9.60	9.00⊙	286	690
American Tobacco Company	297,619,166	156,713,149	5,055,689	64,006	19,572	155,551,567†	28,311,783	84.6	34.35	5.00	2,780	7,948
Amer. Water Wks. & Elec. Co.	419,058,968	43,431,050⊙	2,543,105⊙	19,013⊙	11,000■	10,277,911	4,041,182	71.8	4.39	—	733	934
Amer. Zinc Lead & Smelt. Co.	11,788,293	2,384,663	741,551	5,738	1,866	420,179	596,305	41.3	0.62	—	78	225
Armour and Company	256,557,062▲	130,888,435	5,171,420	81,782	54,268▲	8,840,851▲	5,870,029▲	60.1▲	2.17	—	216	163▲
Armstrong Cork Company	57,328,967	13,422,865	1,463,860	9,489	9,242▲	2,430,839	4,154,066▲	36.9	1.72	2.00	259	263
Atlantic Refining Company	208,326,587	81,399,975	2,811,999	33,514	12,493	37,568,928†	6,219,355	85.8	14.10	1.00	1,293	3,007
Atlas Powder Company	26,045,906	15,329,359	320,875	4,467	3,104°	1,488,262	1,784,429	45.5	5.90	4.25	474	479
Baldwin Locomotive Works	75,348,990	15,699,074	1,106,101	14,426	10,131	5,309,717	1,944,073	73.2	5.16	—	404	524
Baltimore & Ohio R. R. Co.	1,231,320,567	315,158,485	3,151,585	38,937	41,007	11,781,366	5,549,497	68.0	4.60	—	346	287
Beatrice Creamery Company	24,494,129	18,678,350	473,183	7,701	5,958	1,529,729	1,686,309	47.6	4.01	2.00	338	257
Bendix Aviation Corp.♦	49,978,854	10,488,315	2,097,663	22,449	12,954	5,426,829	6,474,754	45.6	2.59	1.75	242	419
Bethlehem Steel Corporation	763,724,034	376,963,130	3,918,881	70,836	118,439	41,345,349	48,677,524	45.9	13.85	5.00	867	349
Borden Company	126,319,215	65,950,560	4,396,704	47,396	27,080	6,477,171	7,582,617	46.1	1.47	1.40	137	239
Borg-Warner Corporation	54,973,463	11,684,283	2,336,713	18,480	10,914	5,650,154	6,730,462	45.6	2.42	1.50	306	518
Bristol-Myers Company	10,031,253	2,646,128	676,173	15,256	809▲	1,329,422▲	2,523,642	34.5	1.97	2.55	87	1,643
Brunswick-Balke-Collender Co.	15,963,667	7,113,929	471,136	2,597	3,300■	1,396,335	2,383,497	36.9	3.14	3.00	610	423
Bucyrus-Erie Company	28,786,714	11,888,535	1,283,326	10,619	2,899	1,957,700	2,507,223	43.8	1.60	1.00	212	675
Burroughs Adding Machine Co.©	34,638,367	25,000,000	5,000,000	17,862	9,210°●	2,313,707	3,146,248	42.4	0.46	0.50	130	251
Butler Brothers	35,977,744	19,350,390	1,393,215	17,595	8,000	1,177,190	1,065,073	52.5	1.05	0.30	87	147
Case (J. I.) Company	43,564,866	29,678,500	296,785	3,708	5,226	1,180,282	1,378,125	46.1	6.05	—	527	226
Caterpillar Tractor Co.	56,875,468	9,411,200	1,882,240	17,175	11,781	5,060,604	7,839,117	39.2	2.69	2.00	295	429
Celanese Corp. of America	86,170,525	32,412,488	1,425,785	11,310	12,000	5,424,954	6,376,896	46.0	4.88	1.25π	747	452
Chicago & North Western Ry.	692,645,754	180,835,300	1,808,353	17,000	25,520	6,599,291	(d) 5,222,369	479.3	4.17	—	423	259
Chrysler Corporation①	267,629,125	21,755,660	4,351,132	51,159	68,877	53,177,345‡	37,802,279	58.4	12.22	5.50	1,039	772
City Ice & Fuel Company	40,271,521	29,249,803	1,313,959	12,240	5,000	2,013,740①	2,164,740	48.2	1.75	1.20	207	403
Colgate-Palmolive-Peet Co.①	68,368,655	37,035,088	2,087,807	14,417	10,000■	3,185,670‡	4,044,760	44.1	1.62	1.00	280	319
Columbia Gas & Elec. Corp.	692,771,401	122,325,956	13,324,283	75,000■	15,299	18,137,261	12,840,480	58.5	1.48	0.30	306	1,186
Commonwealth Edison Company	864,914,519①	314,128,500	12,565,140	100,100	17,048	31,404,055	29,170,756	51.8	2.50	1.80	314	1,842
Cons. Edison Co. of N. Y.	1,383,148,373	591,510,741	13,655,617	132,580	35,988	58,520,682	36,454,864	61.6	5.10	2.00	569	1,626
Continental Can Company	130,486,053	77,079,420	3,053,971	37,552	15,506	5,233,059	8,953,632	36.9	1.83	2.00	149	337
Continental Motors Corp.	13,497,712	3,000,000	3,000,000	27,816	1,703	408,412	611,843	40.0	0.14	—	15	240
Corn Products Refining Co.	110,576,988	88,250,000	2,780,000	21,706	4,805	3,332,854	9,581,054	25.8	1.32	3.00	175	694
Crane Co.	109,192,583	77,996,000	2,541,431	12,464	15,700	3,753,331	5,134,850	42.2	1.60	0.80	373	239
Crown Cork & Seal Company	49,130,174	12,220,374	742,614	7,196	5,218	1,102,852	2,525,968	30.4	2.13	0.50	285	211
Crown Zellerbach Corp.	103,036,783	64,271,495	2,790,854	17,000	8,700	3,775,451①	8,119,494	31.7	1.67	1.00	270	434
Curtis Publishing Company	53,340,852	22,775,800	4,109,112	25,505	4,054	1,647,611	3,044,643	35.1	0.49	—	118	406
Cutler-Hammer, Inc.	9,857,634	3,299,990	659,998	3,249	3,439	1,589,297	1,280,893	55.4	2.41	1.50	489	462
Detroit Edison Company	363,540,993	127,226,000	1,272,260	14,921	6,864①	10,570,687①	10,732,734	49.6	8.31	6.00	708	1,540①
Devoe & Raynolds Company	11,681,435	6,021,056	170,128	2,210	1,650	281,711	249,920	53.0	1.75	0.25	142	171
Diamond Match Company	34,762,775	26,337,500	1,300,000	9,171	4,985	1,466,037	1,962,394	42.8	2.09	1.50	220	294
Douglas Aircraft Company	53,720,910	6,000,000	600,000	7,360	16,725	4,221,757	10,831,971	28.0	7.04	5.00	574	252
Du Pont de Nemours & Co.	934,892,276	389,534,300	12,721,315	78,541	57,200	56,700,000	86,945,173	39.5	5.14	7.00	893	991
Eastman Kodak Company	213,752,108	105,206,220	2,537,670	41,191	27,605▲	13,316,688▲	20,076,739	39.9	5.38	6.00	327	482
Electric Storage Battery Co.	38,688,453	23,516,092	907,810	14,000	5,300■	2,058,972	2,167,592	48.7	2.27	2.00	147	388
First National Stores Inc.	32,702,380	6,720,322	821,137	9,423	14,000	2,386,125	2,575,400	48.1	2.91	2.50	253	170
Food Machinery Corporation	13,339,838	7,729,781	446,676	3,167	1,685	674,462	1,670,704	28.8	1.58	1.50	246	400
[illegible]	[illegible]	[illegible]	28,845,927	214,140	76,314	54,943,000	56,241,083	49.4	1.90	1.85	257	720

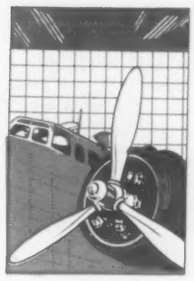
Crown Zellerbach Corp.	103,036,783	64,271,495	2,790,854	17,000	8,700	3,775,451⊙	8,119,494	31.7	1.67	1.00	270	434
Curtis Publishing Company	53,340,852	22,775,800	4,109,112	25,505	4,054	1,647,611	3,044,643	35.1	0.49	—	118	406
Cutler-Hammer, Inc.	9,857,634	3,299,990	659,998	3,249	3,439	1,589,297	1,280,893	55.4	2.41	1.50	489	462
Detroit Edison Company	363,540,993	127,226,000	1,272,260	14,921	6,864⊙	10,570,687⊙	10,732,734	49.6	8.31	6.00	708	1,540⊙
Devoe & Raynolds Company	11,681,435	6,021,056	170,128	2,210	1,650	281,711	249,920	53.0	1.75	0.25	142	171
Diamond Match Company	34,762,775	26,337,500	1,300,000	9,171	4,985	1,466,037	1,962,394	42.8	2.09	1.50	220	294
Douglas Aircraft Company	53,720,010	6,000,000	600,000	7,360	16,725	4,221,757	10,831,971	28.0	7.04	5.00	574	252
Du Pont de Nemours & Co.	934,892,276	389,534,300	12,721,315	78,541	57,200	56,700,000	86,945,173	39.5	5.14	7.00	893	991
Eastman Kodak Company	213,752,108	105,206,220	2,537,670	41,191	27,605▲	13,316,688▲	20,076,739	39.9	5.38	6.00	327	482
Electric Storage Battery Co.	38,688,453	23,516,092	907,810	14,000	5,300■	2,058,972	2,167,592	48.7	2.27	2.00	147	388
First National Stores Inc.	32,702,380	6,720,322	821,137	9,423	14,000	2,386,125	2,575,400	48.1	2.91	2.50	253	170
Food Machinery Corporation	13,339,838	7,729,781	446,676	3,167	1,685	674,462	1,670,704	28.8	1.58	1.50	246	400
General Electric Company	435,562,741	180,287,046	28,845,927	214,140	76,314	54,943,000	56,241,083	49.4	1.90	1.85	257	720
General Foods Corporation	97,304,035	58,271,344	5,401,440	67,158	11,329	7,111,924	15,244,077	31.8	1.35	2.00	109	628
General Mills, Inc.	64,099,348	38,839,260	886,527	9,300	7,500	2,581,978	5,639,274	31.4	3.88	4.00	397	344
General Motors Corporation	1,535,916,531	613,994,784	44,986,373	397,928	224,181▲	210,411,000	195,621,721	51.8	4.88	3.75	559	939
General Theatres Equip. Corp.	12,934,091	6,014,870	586,087	5,800	1,200	413,463	849,820	32.7	0.71	0.85	71	345
General Tire & Rubber Co.	18,458,745	5,009,335	550,598	3,123	3,708	1,364,326	595,917	69.6	2.59	0.50	613	368
Gillette Safety Razor Co.⑨	26,030,555	17,240,768	2,298,769	25,423	4,000■	3,388,175	2,601,094	56.6	1.70	0.40	167	847
Grant (W. T.) Company	47,103,823	18,870,415	1,538,198	4,400■	20,000	3,826,462	3,542,211	51.9	3.22	1.40	957	191
Houdaille-Hershey Corp.	17,093,102	9,283,556	959,000	9,975	5,100	1,698,158	2,333,086	42.1	2.16	1.50	211	333
Illinois Central R. R. Co.	746,223,484	154,445,192	1,544,452	16,955	29,880	10,053,207	1,296,619	88.6	7.40	—	737	336
Inland Steel Company	173,691,939	60,755,310	1,628,625	7,976	19,863	9,209,459	14,450,385	38.9	5.65	5.00	1,155	464
Interlake Iron Corporation	54,924,764	44,000,000	2,000,000	8,345	1,894	707,257	829,450	46.0	0.35	—	85	373
International Shoe Company	84,683,219	50,056,578	3,342,500	7,880	29,641	3,478,049	6,473,612	34.9	1.04	1.75	441	117
Jewel Tea Co., Inc.	10,985,563	4,935,462	555,074	5,158	3,828	1,440,170‡	1,576,995	47.7	2.59	2.40	279	376
Johns-Manville Corporation	58,877,846	23,000,000	917,500	7,758	12,000■	4,642,007	5,882,071	44.1	5.46	2.75	662	387
Kelsey-Hayes Wheel Company	19,044,535	548,267	548,267	3,808	3,194	1,161,945	1,652,745	41.3	2.12	1.00⑩	305	364
Kennecott Copper Corp.	394,647,439	53,199,636	10,821,653	82,140	27,300°	25,065,783	43,837,330	36.4	2.32	2.75	305	918
Kimberly-Clark Corporation	54,682,179*	29,497,687	587,873	2,672	5,057	1,632,656	2,278,961	41.7	3.34	2.00	884	323
Kresge (S. S.) Company	132,670,582	55,178,817	5,517,882	23,455	31,500	8,559,691	10,070,389	45.9	1.55	1.35	365	272
Kress (S. H.) & Company	77,173,452	55,600,357	3,072,565	4,200	12,985	5,184,189	5,339,161	49.3	2.20	1.60	1,675	399
Kroger Grocery & Baking Co.	56,773,235	33,645,462	1,832,856	25,747	22,358°	8,519,225‡	4,607,126	64.9	4.65	2.00	332	381
Lehigh Valley Coal Corp.	33,371,979	20,782,502	1,432,846	13,881	6,775	1,323,145	756,955	63.6	1.10	—	122	195
Libbey-Owens-Ford Glass Co.	52,411,501	15,723,937	2,515,830	14,840	6,279⑪	6,113,710	9,992,766	38.0	2.43	3.50	412	974
Libby, McNeill & Libby	54,116,437	25,395,895	3,627,985	11,744	8,500■	1,501,130	3,075,922	32.8	0.41	0.50	128	177
Liquid Carbonic Corporation	24,017,358	10,500,000	700,000	6,986	3,540	1,089,511	1,544,559	41.4	1.56	1.00	156	308
Long-Bell Lumber Company	34,422,732	22,069,850	319,540	6,900■	5,719	843,771	1,044,493	44.7	4.27	—	122	148
Loose-Wiles Biscuit Company	28,562,597	16,876,000	552,910	5,933	8,893	1,348,019	1,190,805	53.1	2.63	1.00	265	152
Louis. & Nash. R. R. Co.	536,868,677	117,000,000	1,170,000	7,361	25,567	10,304,935	9,537,146	51.9	8.81	6.00	1,400	403
McCall Corporation	16,911,521	9,632,630	527,998	4,368	2,058	510,010	839,304	37.8	0.97	1.40	117	248
McCrory Stores Corporation	23,972,415	6,990,253	1,050,253	3,847	10,300	2,022,714	2,332,511	46.4	2.04	1.25	778	196
McGraw-Hill Publishing Co.	19,926,053	3,000,000	600,000	1,800	1,650	450,000	912,031	33.0	0.75	0.75	250	273
McLellan Stores Company	9,243,178	3,732,685	763,180	2,890	6,100	602,466	982,642	38.0	0.82	0.60	244	99
Mead Corporation	50,891,585	21,355,844	698,701	4,266	4,049	956,658	1,426,881	40.1	1.54	0.25	382	236
Mengel Company	9,658,006	3,712,481	483,149	5,600■	4,669	363,900	431,916	45.7	0.87	—	85	78
Mesta Machine Company	18,796,368	4,931,822	987,979	6,640	3,138	1,760,197	3,083,032	36.3	1.78	2.00	265	561
Middle West Corporation	451,386,158	16,536,513⊙	3,307,303⊙	36,000⊙	8,430	10,753,199	3,953,349	73.1	3.25	0.25⊙	299	1,276
Mnpls.-Honeywell Regulator Co.	13,791,008	6,361,499	652,600	4,539	2,400	1,561,153	2,528,602	38.2	2.51	3.00	406	650
Missouri Pacific R. R. Co.	697,098,562	154,639,600	1,546,396	8,574	21,712	5,718,652	(d) 9,564,457	—	6.90	—	1,661	263
Mohawk Carpet Mills	19,845,170	10,918,396	543,500	3,400	4,733	1,457,559	1,579,205	48.0	2.68	1.25	429	308
Montgomery Ward & Co., Inc.	271,677,204	149,035,664	5,418,701	61,003	54,973	18,035,700#	23,028,017	43.9	3.46	2.00	304	328
Motor Wheel Corporation	15,363,876	4,250,000	850,000	9,072	3,168	1,718,557	2,105,914	44.9	2.02	1.60	189	542
Mullins Manufacturing Corp.	7,217,181	1,984,800	574,825	2,844	1,750	297,943	291,650	50.5	0.55	—	139	170
National Biscuit Company	128,718,605	87,698,980	6,537,493	57,733	19,250	8,022,131	11,148,826	41.8	1.28	1.20	150	417
National Cash Register Co.	49,277,396	24,420,000	1,628,000	18,998	9,500⑫	1,959,957	2,051,727	48.9	1.20	1.00	103	206
Nat'l Dairy Products Corp.	197,786,881	51,266,676	6,255,247	69,264	35,565	9,984,000	11,094,406	47.4	1.60	0.80	144	281
National Gypsum Company	20,895,630	7,416,458	1,323,008	7,609	3,300	828,362	1,565,196	34.6	0.66	0.40	134	251
National Supply Co.	72,944,870	51,839,860	1,725,556	8,702	7,676	2,162,475	1,630,297	57.0	1.87	—	607	282
Neisner Brothers, Inc.	11,199,668	2,514,391	227,986	1,237	4,500	1,142,000‡	443,693	72.0	5.57	1.25	1,398	254
New York Central R. R. Co.	1,844,101,952	562,332,642	6,447,413	62,345	92,516	34,062,837	11,265,084	75.1	5.28	—	546	368
Niagara Hudson Power Corp.	627,480,221	144,290,585⊙	10,065,813⊙	78,500⊙	11,700	17,456,950	8,719,126	66.7	1.82	0.15⊙	233	1,492
North American Company	957,063,677	150,863,210⊙	9,875,365⊙	73,131⊙	18,600	23,640,733	20,316,500	53.8	2.76	1.20π	410	1,271
Ohio Oil Company	133,019,302	93,173,491	6,902,754	35,542	5,630	10,414,000†	8,733,164	54.4	1.59	0.45	327	1,850
Otis Elevator Company	41,406,189	31,500,000	2,065,000	12,667	5,918	1,786,494	2,771,383	39.2	0.89	1.00	156	302
Owens-Illinois Glass Co.	88,518,553	33,265,050	2,661,204	10,547	16,003	4,203,052	7,223,034	36.8	1.58	2.00	399	263
Pacific Gas & Electric Company	790,809,177	290,804,550⊙	11,632,182⊙	96,000⊙	12,737	22,531,000	24,672,908	47.7	3.60	2.00⊙	609	1,769
Packard Motor Car Company	80,309,911	30,000,000	15,000,000	117,975	11,272	4,124,737‡	774,147	84.2	0.27	—	35	366
Penney (J. C.) Company	104,506,384	33,822,767	2,743,984	18,781	49,148	8,887,541#	16,230,609	35.4	3.24	5.00	473	181
Pennsylvania Railroad Co.	2,396,141,517	658,387,700	13,167,754	205,883	109,412	44,069,641	36,896,665	54.4	3.35	1.50	214	403
Peoples Gas Light and Coke Co.	190,667,970	65,600,000	656,000	13,549	4,747	4,903,077	3,035,606	61.8	7.47	3.00	362	1,033
Phelps Dodge Corporation	196,919,643	126,781,500	5,071,260	18,896	12,500	7,053,000	12,603,980	35.9	1.39	1.50	373	564
Phoenix Hosiery Company	7,484,585	3,844,100	204,026	871	3,250	223,866	154,055	59.2	1.28	—	584	69
Pillsbury Flour Mills Co.	30,244,905	13,730,625	549,225	5,946	3,123	860,125	900,914	48.8	1.57	1.60	145	275
Pittsburgh Screw & Bolt Corp.	8,846,641	1,500,000	1,500,000	10,883	1,669	723,895	863,617	45.6	0.48	0.45	67	434
Public Service Corp. of N. J.	715,522,313	270,446,392	7,111,590	85,868	21,071	28,041,529	23,188,425	54.7	5.10	2.40	780	1,331
Pullman Incorporated	232,403,835	152,807,760	3,820,194	34,600	27,700	7,174,865	7,484,126	48.9	1.88	1.50	207	259
Pure Oil Company	184,738,520	112,363,410	4,707,462	42,500■	9,466°	40,289,181†	8,718,057	82.2	10.12	0.25	1,343	4,256
Quaker Oats Company	58,405,768	33,210,000	882,000	8,105	4,063	2,298,981	4,141,511	35.7	3.27	5.00	554	566
Radio Corporation of America	103,940,419	42,622,312	14,795,200									

Pillsbury Flour Mills Co.	30,244,905	13,730,625	549,225	5,946	3,123	860,125	900,914	48.8	1.57	1.60	145	275	
Pittsburgh Screw & Bolt Corp.	8,846,641	1,500,000	1,500,000	10,883	1,669	723,895	863,617	45.6	0.48	0.45	67	434	
Public Service Corp. of N. J.	715,522,313	270,446,392	7,111,590	85,868	21,071	28,041,529	23,188,425	54.7	5.10	2.40	780	1,331	
Pullman Incorporated	232,403,835	152,807,760	3,820,194	34,600	27,700	7,174,865	7,484,126	48.9	1.88	1.50	207	259	
Pure Oil Company	184,738,520	112,363,410	4,707,462	42,500■	9,466°	40,289,181†	8,718,057	82.2	10.12	0.25	1,343	4,256	
Quaker Oats Company	58,405,768	33,210,000	882,000	8,105	4,063	2,298,981	4,141,511	35.7	3.27	5.00	554	566	
Radio Corporation of America	103,940,419	42,622,312	14,795,209	242,000	25,000	7,580,403	9,113,156	45.4	0.55	0.20	33	303	
Real Silk Hosiery Mills	5,078,207	2,280,720	191,949	1,714	3,839⑱	280,000	(*d*) *341,956*	——	1.57	——	213	73	
Republic Steel Corporation	405,317,763	168,002,592	6,047,563	62,122	56,489	16,034,921	21,113,507	43.2	2.83	0.40	307	284	
Revere Copper & Brass Inc.	42,070,237	16,757,195	889,184	4,306	7,850	4,031,691	2,916,011	58.0	7.15	——	1,496	514	
Ruberoid Co.	16,557,154	13,034,164	397,806	1,554	2,979	570,811	802,100	41.6	1.43	1.30	367	192	
Rustless Iron & Steel Corp.	9,795,711	2,114,065	962,732	9,200	1,303	1,454,753	1,275,993	53.3	1.57	0.60	180	1,116	
Sears, Roebuck & Co.	350,430,159	180,491,484	5,712,532	55,011	65,266	32,650,033#	36,086,668	47.5	5.72	4.25	594	500	
Servel, Inc.	18,248,484	1,781,426	1,781,426	13,011	3,778	2,000,899†	2,969,976	40.3	1.12	1.25	154	530	
Shattuck (Frank G.) Company	20,468,860	14,415,136	1,200,000	7,000■	7,500	1,000,000■	297,854	77.1	0.83	0.40	143	133	
Sheaffer (W. A.) Pen Co.	4,719,480	792,595	158,519	2,338	1,390	475,368	812,937	36.9	3.00	3.25	203	342	
Shell Union Oil Corporation	384,009,665	229,181,875	13,401,850	20,448	23,947°	80,502,861†	15,654,678	83.7	6.16	0.75	4,632	3,362	
Silver King Coalition Mines	9,920,310	6,102,335	1,220,467	2,741	560	190,162	467,076	28.9	0.16	0.40	69	340	
Socony-Vacuum Oil Company	940,046,848	467,675,115	31,178,341	114,144	37,312▲	128,801,003†	36,409,055	78.0	4.13	0.50	1,128	3,452	
Southern Cal. Edison Co. Ltd.	401,410,641	166,241,550	6,649,662	94,479	4,496	9,263,372⑮	12,368,722	42.8	2.91	1.75	208	2,060	
Spiegel, Inc.	39,758,573	12,551,316	1,375,658	7,720	5,500■	982,641	1,791,446	35.4	0.77	0.60	170	179	
Standard Brands Incorporated	83,901,580	45,296,216	12,848,108	119,595	10,500	11,350,000	9,905,523	53.4	0.90	0.50	98	1,081	
Standard Oil Company (Ind.)	756,793,245	381,799,562	15,271,982	98,308	32,287°	120,473,097†	33,597,342	78.2	7.89	1.50	1,225	3,731	
Standard Oil Company (N. J.)	2,071,537,919♦	682,089,675	27,283,587	136,355	48,500▲	142,596,067‡▲	123,886,346♦	53.5	5.23	1.75♦	1,046	2,940	
Stewart-Warner Corporation	20,786,964	6,215,315	1,243,063	17,236	5,350	1,855,000	1,470,804	55.8	1.49	0.50	108	347	
Sun Oil Company	152,010,184	93,477,356	2,534,841	8,459	17,354	47,352,430†	7,969,068	85.6	19.45	1.00 π	7,353	2,729	
Swift & Company	314,279,331	150,000,000	5,921,167	59,000	61,000	10,983,616	11,183,484	49.5	1.85	1.20	186	180	
Texas Corporation	675,196,768	271,899,850	10,875,994	88,452	29,262⑱	123,008,134†	31,547,662	79.6	11.31	2.00	1,391	4,204	
Texas Gulf Sulphur Company	62,354,671	26,175,000	3,840,000	32,078	670	4,112,000	9,140,888	31.0	1.07	2.50	128	6,137	
Tide Water Associated Oil Co.	205,692,061	113,613,056	6,872,676	30,510	10,411	35,450,776†	9,519,083	78.8	5.56	0.70	1,424	3,405	
Timken-Detroit Axle Company	17,811,128	9,880,750	988,075	9,378	4,000	3,285,000	3,649,059	47.4	3.32	3.25	350	821	
Transcontinental & Western Air	10,288,943	4,750,000	950,000	23,000■	2,806°	225,518	(*d*) *232,455*	——	0.24	——	10	80	
Union Pacific Railroad Co.§	1,213,787,676	321,834,100◎	3,218,341◎	50,441◎	35,575	15,830,851	19,445,880	44.9	7.12	6.00	395	445	
United Carbon Company	33,527,993	11,952,538	397,885	3,916	824	1,223,332	1,336,331	47.8	3.07	3.00	312	1,485	
United Drug, Inc.	56,966,408	7,002,800	1,351,586	17,885	15,600	1,806,710	1,103,945	62.1	1.34	——	101	116	
United Gas Improvement Co.	846,182,298	279,258,154◎	24,017,226◎	125,500◎	13,209	20,021,948	28,006,353	41.7	0.86	1.00◎	187	1,516	
United States Rubber Co.	192,805,965	82,470,020	2,387,183	23,069	41,889	26,004,002‡	11,425,241	69.5	14.98	——	1,965	621	
United States Steel Corp.	1,854,585,741	1,013,025,000	12,306,063	216,706	254,393	85,420,545	102,211,282	45.5	9.81	4.00	523	336	
Walgreen Company	29,494,690	20,972,925	1,386,710	11,300	13,000	3,434,308‡	3,149,541	52.2	2.66	1.60	404	264	
Western Union Telegraph Co.	383,368,339	104,527,744	1,045,277	28,525	51,153°	5,898,000¶	3,621,581	62.0	5.64	1.00	207	115	
Westinghouse Air Brake Co.	56,829,321	34,893,218	3,172,111	22,612	6,871	4,967,079	5,591,606	47.0	1.57	1.75	220	723	
Westinghouse Elec. & Mfg. Co.	240,712,228	133,606,450	2,672,129	43,642	52,723	22,533,313	18,985,428	54.3	8.69	4.75	539	427	
White Motor Company	27,318,685	625,000	625,000	5,696	4,392	2,011,342‡	1,952,727	50.7	3.22	——	353	458	
Woolworth (F. W.) Co.	256,398,382	95,853,041⑱	9,703,609	69,526	72,605	15,396,854#	24,104,816	39.0	1.59	2.40	221	212	
Yellow Truck & Coach Mfg. Co.	61,170,090	17,397,985	3,143,965	12,863	8,709	7,653,804	5,813,976	56.8	2.55	1.425	642	879	
Young Spring & Wire Corp.♦	11,112,167	5,439,967	408,658	3,820	4,900	512,183	488,158	51.2	1.25	0.50	134	105	
Youngstown Sheet & Tube Co.	251,239,106	120,088,053	1,825,008	13,313	24,324	5,497,000	10,815,468	33.7	3.28	1.25	521	226	
TOTAL for 165 Companies	$44,974,942,130	$16,811,213,108	699,013,130Ø	6,359,876⊕	3,490,601	$2,565,356,532	$2,022,987,658						
AVERAGE PER COMPANY								**55.9%**	**$3.92**	**$1.91**	**$451**	**$735**	

Note: Unless otherwise indicated, the tabulation above includes consolidated figures for companies having subsidiaries.
[c]Consolidated. [a]Domestic only. [p]For parent company only. †Excise taxes included constitute more than 50 per cent of total. ‡Excise taxes included constitute between 25 and 50 per cent of total. ■Approximate. °At end of year. ♦Fiscal year changed—Bendix Corp. report for 9 months ending Sept. 30, 1940; Young Corp. report for 7 months ending July 31, 1940. [u]For U. S. and Canada only. π Plus special stock dividend. (*d*) Deficit. #Does not include sales tax. ♦Domestic and foreign. §Including its leased lines. ¶In addition, patrons paid $4,328,000 for Federal message taxes. ①Includes special dividend of $1.50 payable in preferred stock at $10 par. ②Does not include taxes on telephone messages paid by customers. ③Foreign subsidiaries not included. ④Does not include $2,537,801 for beer excise taxes. ⑤Does not include English and Continental European subsidiaries. ⑥Depreciation reserve of $133,611,759 not deducted. ⑦Includes Canadian taxes, stated in U. S. dollars, in amount of $819,691. ⑧Operating. ⑨Much of this company's business is conducted in foreign countries, many of its assets are located there, and an even larger part of the taxes are paid to foreign countries. ⑩On Class "A". ⑪Factory. ⑫Factory and field. ⑬Manufacturing and office. ⑭Includes provisions in the amount of $2,501,311 for the additional taxes based on income which would have been accrued for 1940 if the Company had not had the benefit for tax purposes of deductions for discount, redemption premium, and expense incident to the refunding of bonds. This amount has been applied in reduction of unamortized debt discount, redemption premium, and expense carried in the balance sheets. ⑮Excluding Europe. ⑯Excludes 46,391 shares of treasury stock at ledger value of $1,646,959. ØIncludes 653,815,300 common shares. ⊕Includes 5,686,689 common stockholders.

WING TIPS

Airplanes "on order" have twice the value of total United States and Canadian automobile and truck output in 1940. Huge program to require services of thousands of small plants, in addition to auto builders and large aircraft producers . . . Conflict between proponents of radial and in-line engines continues, but some engineers believe they may reach a meeting of minds soon



■ CURRENTLY on order with American industry is nearly eight and one quarter *billion* dollars worth of airplanes, airplane engines and accessories—this out of a total present defense appropriation of forty-one and a half billions. Thus 20 per cent of the defense program is, so to speak, "in the air", as well it might be in view of developments in Europe and the Mediterranean in recent months. Looking at it another way, this airplane order is well over twice the value of all the motor cars and trucks produced in this country and Canada in 1940.

Airplane manufacture, it must be remembered, is an infant industry, now struggling hard to assume adult proportions. Helping in this struggle is all American industry, for only by such co-operation can the job be done. Inter-industry jealousies and dog-fights must be forgotten.

Notable for the high standards of product quality and the painstaking care over inspection it practices, the airplane industry will have to relax, at least in some small measure, in the interests of production. Other industries, automotive for example, now have to look at the matter of building transportation equipment through different colored glasses, setting aside for awhile the idea of cutting costs to the bone, speeding up and mechanizing production, and jaywalking on quality and inspection.

Bomber Program Nearly Trebled

The auto industry has been in the heavy bomber picture for about a year now and production can be said to have started, if only in a small way. Originally the schedule called for Ford, General Motors and Chrysler to supply parts and subassemblies for 100 bombers a month each, these parts to be routed to five new assembly plants —at Tulsa, Fort Worth, Kansas City, Omaha and Dallas—where final assemblies and installation of engines would be handled by crews from four aircraft companies, Consolidated at Fort Worth, Douglas at Tulsa, North American at Dallas and Kansas City, and Martin at Omaha.

Already this program has been doubled, if not trebled, and Ford Motor Co. is building a plant at Ypsilanti, Mich., which will supply subassemblies for Consolidated and Douglas, and will house a 3500-foot final assembly line where complete ships will be built and the motors installed from the nearby Ford-operated Pratt & Whitney engine plant at Dearborn.

Incidentally, schedules for this radial-engine plant, originally calling for 15 engines per two-shift day, have been better than doubled to 40 engines a day, presumably so that a supply of engines can be fed to the bomber line at Ypsilanti. Initial orders for the engines have been boosted to 10,000, costing $260,000,000. By fall certain sections of the Ford bomber plant should be producing, and by the first of the year should be well on the way toward turning out completed planes.

Fisher Body has started production in its refurbished plant at Memphis, Tenn., although all engineering and purchasing are centered in the General Motors building, Detroit, where Fisher has commandeered almost a whole floor of offices to house personnel of the newly organized Fisher Memphis Aircraft Division. Three Fisher plants at Detroit will co-operate on the project.

Chrysler Corp., Goodyear Tire & Rubber Co. and Hudson Motor Car Co. constitute a triple entente which will feed the Martin-Nebraska bomber assembly plant, and all three have started in a limited way. Chrysler received just recently a $42,000,000 order for nose and center fuselage sections from Glenn L. Martin-Nebraska Co., although for months it has been lining up plant facilities for this work. Meanwhile, Douglas, Vega and Boeing aircraft companies have been drawn into the picture and will take on some of the heavy bomber or flying fortress construction work. Murray Corp. of America and Briggs Mfg. Co. also are now at work on airframe parts construction programs.

Small Plants Must Help

So we see at last a partial coagulation of automobile and aircraft companies to build bombers. But the eventual success of the effort is not going to depend so much on the efforts of these major producers as it is upon the thousands of small industrial plants throughout the country, supplying everything from cable wire to chrome-molybdenum steel tubing for use in airplanes.

Just as the success of the motor industry in achieving mass production of cars has been built upon the productive ability of suppliers of material, parts and equipment, so must this aircraft program succeed or fail. The motor companies and aircraft producers know how to put the planes together, how to tool equipment for subassemblies and the like, but they are stymied if they cannot get rivets, if they lack screw machine parts, if they cannot get aluminum castings and forgings, if there is a shortage of small motors, pumps, valves, tubing and such.

So it would appear that the nation's small and medium-size metalworking and parts industries, as well as the larger supply interests, might do well to keep abreast of progress in defense aviation and to learn where and how they can contribute to keeping the manufacturing program "on time". If in some way the regularly appearing com-

ment, herewith christened "Wing Tips," can prove of assistance, it will have served its purpose.

Radial, In-line Enginemakers Still Arguing Pros and Cons

The battle is raging, despite outward calm, between proponents of radial and in-line airplane engines. Both are being produced in large quantities; both are being installed in planes. At present the picture is Allison and Rolls-Royce for the in-line engines, and Pratt & Whitney for the radials. Allison has virtually doubled the size of its plant at least three times and is now supplying "several hundred" engines a month. Machinery is on order, buildings are in readiness and men are being trained for another doubling of schedules by the end of this year, aiming toward a goal of 500 engines a month. It is estimated that there are better than 800 planes flying in this country now, Allison powered, some with two engines.

Allison last week received additional contracts for engines amounting to $50,000,000, bringing its total since the beginning of the emergency to $242,000,000.

Pratt & Whitney engines will be manufactured by Ford at Dearborn, by Buick at Melrose Park, Ill., and by Chevrolet at Tonawanda, N. Y., in addition to those being turned out by P&W in the East. Wright is rushing a new plant at Lockland, O., and is delivering engines regularly from Paterson, N. J. Studebaker is planning to build 1000 Wright engines monthly in new plants at South Bend, Fort Wayne and Chicago. Meanwhile, Ford is putting on the test block a new in-line engine, liquid cooled and supercharged by an exhaust-driven turboblower. It is patterned after the 1350-horsepower Rolls-Royce in-line engine which Packard is now assembling at a rate of one a week.

A lately publicized development is the perfection by Allison engineers of a method by which a 15 per cent increase in power of the Allison V-1710 engine has been achieved without any increase in size and weight. An improved model has just passed army tests delivering 1325 horsepower at takeoff and military rating, against 1150 horsepower, top rating heretofore.

No information has been released on the "relatively simple improvement" which has brought this increase in power, but a good guess would be some change in the supercharger by which greater pressure of fuel and air mixture is delivered to the cylinders.

Pros and cons of radials versus in-lines have been argued by the best authorities, both military and industrial, with the situation now just about as divided as it ever was. Actually, though, there is not the wide gap between these two types of air engines that might appear at first glance. As one engineer views the matter, engine builders are coming down the two branches of a Y, and before long may meet at the juncture. At that time the radial and the in-line will be nearly one and the same.

"Meeting of Minds" May Result From Demands for More Power

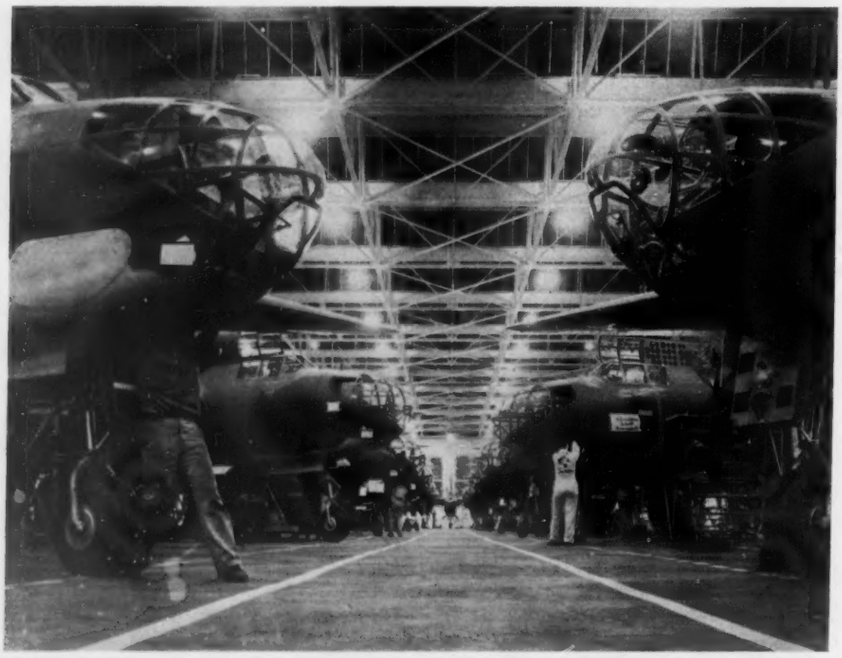
How? Well, consider the gradual increase in engine horsepower which has been demanded in fighting planes, in the interest of higher speed. For reasons of design and compactness, there is a limit to the number of cylinders which can be fanned around a radial crankshaft, so when a 2300 or 2800 horsepower radial is asked for, the solution is to design a double bank of cylinders. Now when the engine builders are called upon for 4000 or 5000-horsepower plants, they will have to add more banks, and what they will end up with will be a series of air-cooled in-line engines. By this time, it may prove difficult to air cool the rear banks, so they will have to turn to liquid cooling, and the engine then will be just a bunch of Allisons or Rolls-Royces set around the propeller shaft. So where is the argument then?

Nevertheless right now there is speculation about the Allison engine, just as there always is about any comparatively new development. Anything new is the first to "get the ax" whether or not the facts of the matter merit such treatment or not. For example, three Allison-powered Bell Airacobras based at Selfridge Field in Michigan have crashed in flames in recent months —for no apparent reason, judging from the unlucky pilots' statements. They have said that the engine just caught on fire, so they bailed out.

Accredited research experts, in studying these misfortunes, have come to the conclusion that the accidents may have been the result of pilots failing to realize or be instructed in peculiar characteristics of the Allison engine. As the throttle is opened to near the top point, the engine performance becomes smoother, and as the tachometer needle starts on its second trip around the dial, indicating the second 2500-r.p.m. cycle, the pilot does not have the warning vibration or chatter which is characteristic of radial engines as they near the wide-open throttle position.

From this it would appear that the Allison can be opened dangerously wide, to the point where the fire hazard is acute. Corrective might be to apply some sort of top speed governor.

Night Production of Night Fighters



■ Night crews rush production of DB-7B attack-bombers, recently acclaimed as night fighters by British airmen, in Douglas Aircraft Co.'s Santa Monica, Calif., plant. They are equipped with heavy armament, self-sealing fuel tanks and armor plating. With a backlog in excess of $400,000,000 nearly 28,000 Douglas employes are working round the clock on attack ships, dive bombers and military transports for the United States and Great Britain. NEA photo

$3,061,000,000 Allocated for Expansion of Defense Facilities

■ DEFENSE plant expansion commitments at the end of May had risen to a total of $3,061,000,000, covering 1847 projects, the Office of Production Management announced last week. In addition, applications had been made for certificates of necessity on plant facilities totaling $281,000,000, upon which action had not been taken, bringing the total to $3,342,000,000.

Government obligations comprise about 75 per cent of the money allocated, and 22 per cent of the projects. The total does not include private projects for which certificates of necessity have not been requested.

Government commitments as of May 31 cover 397 projects estimated to cost $2,291,000,000; private commitments cover 1450 plants estimated to cost $770,000,000.

Of the government commitments, $927,000,000 represents the share of the army and $730,000,000 represents the navy's spending. Defense Plant Corp. is commited for $505,000,000, and other government agencies for $129,000,000.

Types of products to be produced in the facilities and the source of funds for constructing them are shown in the following table:

Product	Total	Source of Funds Public	Private
	(Thousands of Dollars)		
Chemicals	$412,535	$358,593	$53,942
Petroleum, coal..	25,131	13,396	11,735
Iron, steel	284,264	135,660	148,604
Ammunition, shells, bombs..	404,783	366,503	38,280
Guns	231,433	208,867	22,566
Aircraft	613,748	518,092	95,656
Ships, ship repair	486,816	476,003	10,813
Vehicles, tanks ..	43,340	23,720	19,620
Nonferrous metals	229,744	83,730	146,014
Machinery	153,454	49,621	103,833
Electrical equipment	34,666	18,414	16,252
Miscellaneous mfg.	53,538	38,252	15,286
Nonmanufacturing	87,635	.....	87,635
Total	$3,061,087	$2,290,851	$770,236

Ohio has been awarded the greatest share of government-financed plants with $203,678,675. Indiana is second with $199,254,084; Pennsylvania third with $196,717,512; New York fourth with $174,521,282; Michigan fifth with $160,754,440; and Illinois sixth with $151,276,631.

NAM Reports Defense Work "On Schedule"

Production for defense in the United States is "on schedule or ahead" of government requirements according to a survey of 16 major defense industry areas by the National Association of Manufacturers. Substantial decline in delays caused by shortage of machine tools was noted in the report, released last week. In May, 29 per cent of manufacturers queried declared their output was hampered by lack of machine tools, against 63 per cent in January.

Materials shortage still faced most manufacturers, an average of 80 per cent of those responding stating this constituted a major obstacle, said the report.

Increasingly widespread need for skilled labor was emphasized. Percentage of manufacturers indicating such need increased from 45 in January to 56 in May.

Major source of delay was reported to lie in changes in specifications after orders had been placed, 59 per cent of the manufacturers mentioning that difficulty. Improvement of government inspection techniques was indicated by a drop from 70 per cent in April to 41 per cent in May in complaints on that score.

Highlights of reports from key defense production areas:

Philadelphia: Production one to six weeks ahead of schedule. Many plants working 24 hours a day, seven days a week.

Cleveland: Output records broken and new records will be established in next six months.

Pittsburgh: Ordnance manufacture on schedule or ahead.

Hartford, Conn.: 5000 machine guns being turned out daily. Aircraft engine deliveries at rate not expected before December.

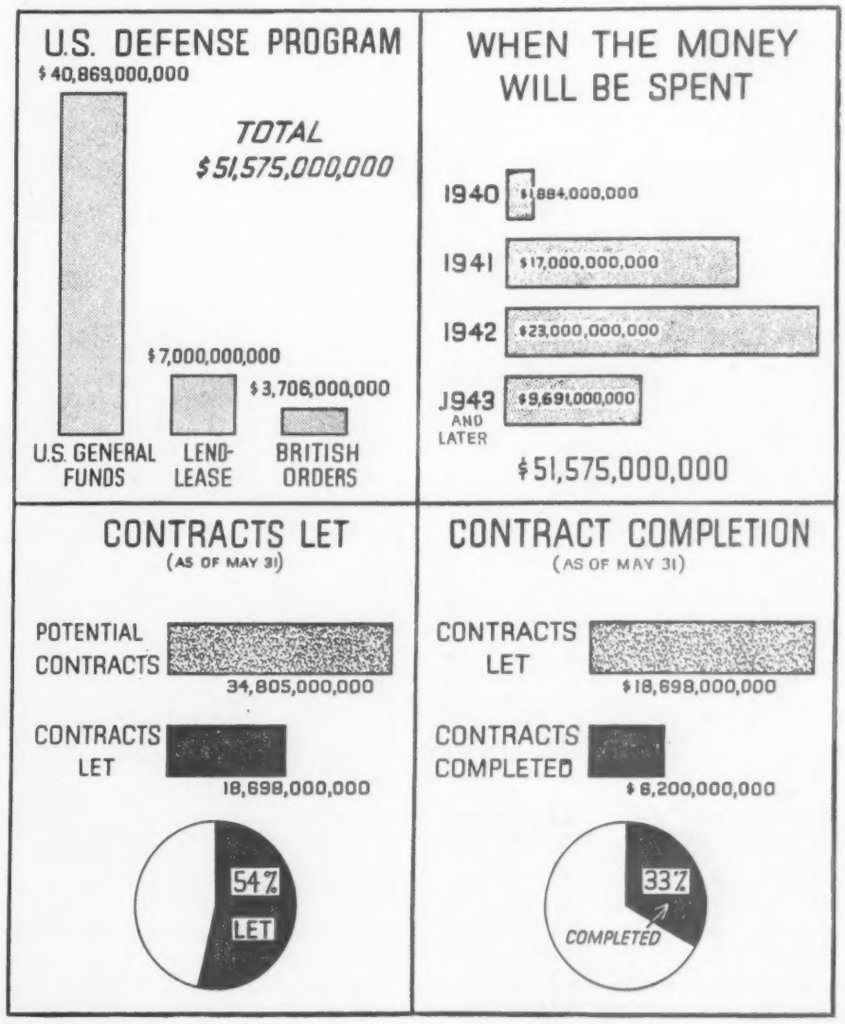
Buffalo: Labor scarce, but defense goods rolling out on schedule.

Youngstown, O.: Only idle steel plants are those down for repairs. Many operating above rated capacity.

York, Pa.: No holiday layoffs, no vacations, 24-hour operation keeps deliveries earlier than required.

Detroit: Shell, gun, aircraft and parts production accelerating.

Accompanying chart, prepared by the association, summarizes other features of its report.



Army's Awards in Week $156,146,388; "Billion a Month for Defense by Fall"

■ EXPENDITURES for defense will probably rise to $1,000,000,000 per month next fall, compared with average of $800,000,000 at present, according to Harold D. Smith, director of the budget. Although he predicted an early upturn in defense production, Mr. Smith said he did not expect defense spending in the new fiscal year would exceed his earlier estimate of $15,500,000,000, unless war was declared.

Defense contracts reported last week by the War Department totaled $156,146,388. Awards for construction of new plants for production of war materials, and supplemental contracts for expansion of plants already under construction or in operation, comprised a major part of the total valuation. Ordnance Department placed most contracts in the period; many, however, were small. Awards reported:

Badger, E. B., & Sons Co., Boston, additional TNT and DNT capacity at the Plum Brook Ordnance Plant, Sandusky, O., at cost of $9,252,911.

Brown & Root Inc., Houston, Tex., ammunition storage depot at Texas Ordnance Depot, Texarkana, Tex., including railroads, roads, magazines, loading platforms, shelters, fences, miscellaneous buildings and utilities. Gieb, LaRoche, Dahl & Chappell, Dallas, Tex., have architectural-engineering contract. Project's total estimated cost is $9,411,827.

Cahill Bros. Inc., San Francisco, motor transport facilities at Ft. Ord, California, including maintenance shop, warehouse shop, miscellaneous buildings and utilities for a fourth echelon motor repair base. Architectural-engineering contract was awarded to Hunter & Hudson, San Francisco. Total estimated cost, $1,230,171.

Du Pont, E. I., de Nemours & Co., Wilmington, Del., addition of TNT, DNT and Tetryl facilities to the smokeless powder plant now under construction at Sylacauga, Ala. Estimated total cost of plant is $14,871,820 for construction, and $10,890,000 additional for equipment.

Fruin Colnon Construction Co. and Fruco Construction Co., both of St. Louis, supplemental agreements to fixed fee contracts for expansion of production facilities at the St. Louis Ordnance Plant for manufacture of small arms ammunition at total cost of $59,199,559. Construction costs are estimated at $33,999,559, balance is for acquisition of equipment and machinery. This expansion brings total estimated cost of the plant to $89,526,149, with $47,331,149 for construction and balance for machinery and equipment.

Hardaway Contracting Co., Columbus, Ga., advanced single engine training school at Moultrie, Ga., for the air corps. Project includes approximately 115 cantonment type buildings, construction of field and appurtenant facilities at cost of about $3,999,456. J. B. McCrary Engineering Corp., Atlanta, Ga., has architectural-engineering contract.

Hunkin-Conkey Construction Co., Cleveland, additional loading facilities at the Ravenna Ordnance Plant, Ravenna, O., estimated to cost $4,405,407. Wilbur Watson & Associates, Cleveland, handling architectural-engineering services.

Petry, N. G., Denver, and P. S. Cook Plumbing Co., Cheyenne, Wyo., additional replacement center facilities at Ft. Francis E. Warren, Wyoming, including approximately 70 additional buildings. Walter W. Flora, Cheyenne, awarded contract for architectural-engineering services. Total estimated cost, $1,032,758.

Priester Construction Co., Davenport, Iowa, $546,778 for administration building and utilities at Rock Island Arsenal, Illinois.

Tompkins, Charles H., Co., Washington, recreation and miscellaneous facilities at Ft. Belvoir, Virginia, including recreation facilities, chapels, ponton bridge equipment storage, vehicle sheds, fencing, roads, lighting systems. Baskerville & Son, Richmond, Va., received architectural-engineering contract. Total estimated cost, $3,599,806.

Ordnance Department Awards

Ace Drill Co., Detroit, twist drills, $2326.08.

Acme Industrial Co., Chicago, gages, $10,354.50.

Addressograph-Multigraph Co., Addressograph Division, Davenport, Iowa, addressograph and counter with attachments, $1042.33.

Affiliated Machine & Tool Co., New York, gages, $4704.

Albert & Davidson Pipe Corp., Brooklyn, N. Y., steel pipe, $1107.

All-Tool Co., Hillside, N. J., punches, guides, plugs, sleeves and pins, $1896.

American Broach & Machine Co., Ann Arbor, Mich., rotary broaching machine, $8371.

American Can Co., Maywood, Ill., cans, $4856.45.

American Car & Foundry Co., Berwick, Pa., engine assembly supports, parts for tanks, $12,666.15.

American Fork & Hoe Co., Cleveland, commercial mattocks, $2264.99.

American Locomotive Co., New York, casting machine equipment, $13,993.50; Railway Steel-Spring Division, Latrobe, Pa., springs, $7210.32.

American Machine & Metals Inc., East Moline, Ill., testers, $1452.

American Type Founders Sales Corp., New York, job presses, $1285.15.

Ampco Metal Inc., Milwaukee, seamless brass tubing, $2565.

Animal Trap Co. of America Inc., Lititz, Pa., plugs, fuze hole, for adapters, $3360.

Apex Tool & Cutter Co. Inc., Shelton, Conn., cutters and blades, mills, $14,861.40.

Armstrong, G. R., Manufacturers Supplies Inc., Boston, screws, $2251.40.

Automatic Machine Products Co., Attleboro, Mass., primers, $71,700.

Aviation Mfg. Corp., Spencer Heater Division, Williamsport, Pa., ammunition parts, $33,000.

Baldwin Locomotive Works, Baldwin Southwark Division, Eddystone, Pa., fatigue testing machines, $1590.

Barbour Stockwell Co., Cambridge, Mass., tachometers, $21,336.

Barrett, Leon J., Co., Worcester, Mass., drying and oiling machines, $2840.

Barwood & Co., Philadelphia, gages, $1006.10.

Bearings Co. of America, Lancaster, Pa., ball bearings, $1147.50.

Belknap Hardware & Mfg. Co. Inc., Louisville, Ky., machinist hammers, $1031.25.

Belmont Smelting & Refining Works Inc., Brooklyn, N. Y., copper ingots, $1543.

Bendix Aviation Corp., Bendix, N. J., starting cranks, parts for tanks, coils and solenoids, $56,667.37; Scintilla Magneto Division, Sidney, N. Y., magneto spare parts, $30,683.60; Eclipse Aviation Division, Bendix, N. J., starting cranks, voltage regulators, parts for light tanks, 12-volt electric stars, $24,951.34.

Bennel Machine Co. Inc., Brooklyn, N. Y., thread cleaning machines, fixtures and scoops, $2598.28.

Berkeley Equipment Co., Corry, Pa., furnish and install motor drives for presses, heading machines and pocketing machines, $3944.

Berry Bearing Co., Chicago, sights, gun mounts, $4143.78.

Besly, Charles H., & Co., Beloit, Wis., grinding machines, $1180.

Bethlehem Steel Co., Bethlehem, Pa., breech ring forgings, $26,375.

B. G. Corp., New York, elbows, tanks, $6015.

Blakeslee, G. S., & Co., Cicero, Ill., washing machines, $3045.

Bliss, E. W., Co., Brooklyn, N. Y., valve assemblies for hydraulic press, $2200.

Breeze Corps. Inc., Newark, N. J., parts for tanks, $397,018.05.

Bridesburg Engineering Co., Philadelphia, wrenches, $2393.

Bridgeport Thermostat Co. Inc., Bridgeport, Conn., arming wire assemblies, $1880.

Brown & Sharpe Mfg. Co., Providence, R. I., blades for pinion turning machines, grinding machines, cams and tools for automatic screw machines, parts for milling machine, $26,599.02.

Buckeye Traction Ditcher Co., Findlay, O., single drum winches for tractors, $27,048.

Budd Wheel Co., Detroit, artillery ammunition, $427,040.

Burgess-Norton Mfg. Co., Geneva, Ill., track parts, $2036.88.

Byers Office Equipment Co., Davenport, Iowa, metal typist and clerical chairs, $1387.50.

Canister Co., Phillipsburg, N. J., wrench parts and crimping machines, $3666.

Carboloy Co. Inc., Detroit, reamers, $2279.50.

Carpenter Steel Co, Reading, Pa., steel, $17,676.66.

Carrier Corp., Syracuse, N. Y., refrigeration cycle equipment, $6775.

Central Engineering & Supply Co., Chicago, screws, nuts and bolts, $3216.79.

Central Iron & Steel Co., Harrisburg, Pa., steel plate, $4403.38.

Chase Brass & Copper Co., Waterbury, Conn., brass tubing and equipment, brass, $5326.60.

Chase, Parker & Co. Inc., Boston, cutters and mills, $3158.61.

Chicago Flexible Shaft Co., Chicago, fuzes, $327,684

Cincinnati Milling Machine Co., Cincinnati, die sinking machines, $51,280.

Cincinnati Planer Co., Cincinnati, hydro double housing planer, $30,675.

Clapp, E. D., Mfg. Co., Auburn, N. Y., drop forgings, $1185.50.

Cleveland Automatic Machine Co., Cleveland, machines—turret, single spindle, shaft, $81,582.10.

Cleveland Cutter & Reamer Co., Cleveland, milling cutters, $1906.20.

Cleveland Hardware & Forging Co., Cleveland, forgings, $1419.30.

Cleveland Twist Drill Co., Cleveland, drills, $3484.28.

Climax Molybdenum Co., Langeloth, Pa., ferromolybdenum, $102,978.91.

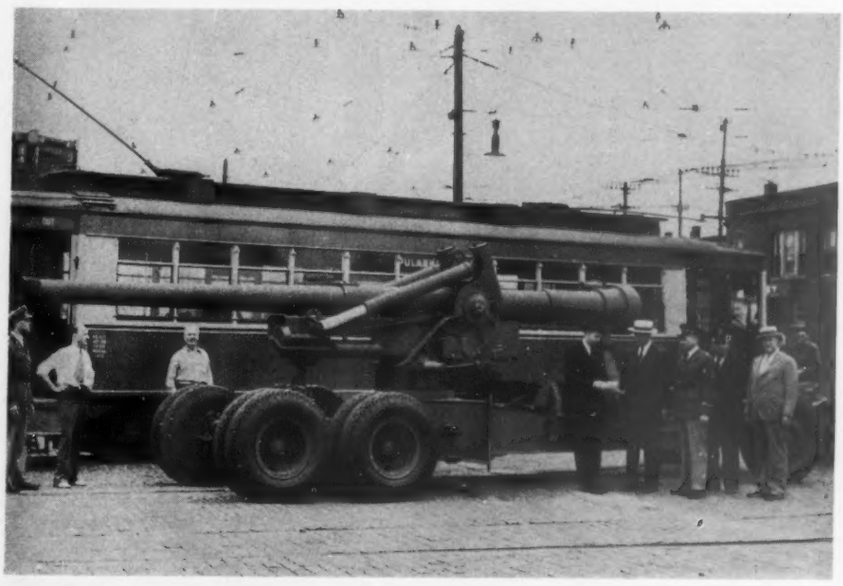
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., small arms materiel, $215,455.31.

Consolidated Packaging Machinery Co., Buffalo, loading equipment, $24,805.

Continental Motors Corp., Muskegon, Mich., exhaust pipe flanges, motor as-

semblies parts, parts for tanks, $46,297.99.
Continental Roll & Steel Foundry Co., Corapolis, Pa., steel castings, $5490.
C-O Two Fire Equipment Co., Newark, N. J., carbon dioxide gas fire extinguishers, $1008.
County Supply Co., Plainfield, N. J., tools, $1026.71.
Crescent Electric Supply Co., Davenport, Iowa, luminaries and standards, $11,168.30.
Crucible Steel Co. of America, New York, steel, $27,511.46.
Cuno Engineering Corp., Chicago, filters, $1680.
Cutter, Wood & Sanderson Co., Cambridge, Mass., cutters and mills, $3147.66.
Cyclone Fence Co., Newark, N. J., wire work partition, $1091.91.
Edgcomb Steel Co., Philadelphia, tool steel forgings, tool steel, $2801.31.
Electro Metallurgical Sales Corp., Niagara Falls, N. Y., base metals, $144,246.82.
Evans', John, Sons Inc., Philadelphia, firing pin springs, $1075.
Federal Tool Corp., Chicago, gages, $6130.
Finkl, A., & Sons Co., Chicago, steel, $2316.60.
Ford Motor Co., Dearborn, Mich., spare parts for service trucks, $37,713.17.
Foster, L. B., Co., Pittsburgh, railroad supplies, $1035.35.
Fox Munitions Corp., Philadelphia, gages, $14,614.60.
Frazer, H. B., & Co., Philadelphia, furnish and install fluorescent lighting system, $26,500.
Fruehauf Trailer Co., Detroit, trailers, $242,024.50.
Fuller, E. C., Co., New York, job presses, $7531.
Gas-Weld Equipment Co. Inc., Boston, electrode holder equipment, $2289.04.
General Cable Corp., St. Louis, cable and reels, $6183.
General Electric Co., Philadelphia, electric motors, $1546.40.
General Motors Corp., Harrison Radiator Division, Lockport, N. Y., coolers, $7637.50.
General Steel Casting Corp., Eddystone, Pa., steel castings, $2792.58.
G. M. Mfg. Co. Inc., Long Island City, N. Y., supports for fuze plunger, $4500.
Goddard & Goddard Co. Inc., Detroit, cutters and blades, $3367.20.
Good Roads Machinery Co. of New York Inc., Albany, N. Y., road roller, $2270.
Gould & Eberhardt, Irvington, Newark, N. J., shaper, $3666.
Grainger Rush Co., Boston, cable and copper wire, $2070.
Greenfield Tap & Die Corp., Greenfield, Mass., gages, hand taps, $16,690.39.
Gurley, W. & L. E., Troy, N. Y., telescopes, $5800.
Hampden Electric Supply Co., Springfield, Mass., galvanized steel conduit, $1408.
Handy Governor, Ann Arbor, Mich., parts for tanks, $9168.25.
Hanson-Whitney Machine Co., Hartford, Conn., gages, $10,224.08.
Hanssen's Sons, Louis, Davenport, Iowa, wrenches, $6346.63.
Hayes, C. I., Inc., Providence, R. I., preheating furnaces, $1985.50.
Hesse Machine & Mfg. Co. Inc., Boston, gages, $1000.
Hires, Castner & Harris Inc., Philadelphia, primer foiling presses, $7300.
Hobart Bros., Troy, O., portable welders, $3090.
Hydraulic Controls Inc., Chicago, pumps, $4650.
Hydril Co. of Pennsylvania, Rochester, Pa., artillery ammunition, $420,700.
Improved Paper Machinery Corp., Nashua, N. H., vacuum washer, $8551.
Independent Pneumatic Tool Co., Chicago, air motor hoists, $5248.
International Business Machines Corp., New York, time recording equipment, $6561; International Time Recording Division, Springfield, Mass., parts for accounting machines, $3220.50.
International Harvester Co., Chicago, tractor parts, $11,450.11.
Johnson Brass Co., Roxbury, Mass., aluminum bronze castings, $38,905.44.
Johnson-Claflin Corp., Marlboro, Mass., gages, $7198.50.
Johnson Tool & Engineering Co., Dayton, O., pyrotechnic pistols, $288,706.55.
Jones & Laughlin Steel Corp., Pittsburgh, cold drawn steel, steel bars, steel, $189,207.57.
Kelly, John P., Philadelphia, aluminum bronze castings, $12,209.63.
Kidde, Walter, & Co. Inc., New York, fire extinguishers, $2963.50.
Kilgore Mfg. Co., International Flare-Signal Division, Tippecanoe City, O., components for pyrotechnic pistol, $3610.38.
Landis Machine Co., Waynesboro, Pa., taps, parts and chasers, $12,285.50.
La Salle Steel Co., Hammond, Ind., steel, $2608.27.
Latrobe Electric Steel Co., New York, tool steel, $1120.
Lewis, George C., Philadelphia, installation of air conditioning system and exhaust system, $3655.
Liberty Tool & Die Corp., Rochester, N. Y., head punches, $3000.
Lincoln Electric Co., Cleveland, portable welders, $2025.
Lindley Electric Supply Co., Philadelphia, wire, switches, renewable wire fuses, $6189.43.
Link-Belt Co., Ewart Plant Division, Indianapolis, malleable iron castings, $1873.40.
Losco Lead Seal Co., New York, lead seals, $1590.
Louden Machinery Co., Fairfield, Iowa, installing monorail system, $29,887.
Lucas, J. L., & Son Inc., Bridgeport, Conn., steel boxes, $2200.
Lyon Metal Products Inc., Davenport, Iowa, steel shelving sections, $2379.
Marlin-Rockwell Corp., Jamestown, N. Y., ball bearings, $1292.
Merko Co., Los Angeles, gages, $1676.
Midwest Tool & Mfg. Co., Detroit, cutters, $1100.
Minnich Machine Works Inc., Philadelphia, double chamber metal baling press, $1395.
Modern Tool & Die Co., Philadelphia, gages, $14,175.20.
Morris, Wheeler & Co., Philadelphia, reinforcing steel, $1550.
Morse Twist Drill Co., New Bedford, Mass., taper shank end mills, $1349.10.
Motor Wheel Corp., Lansing, Mich., disk and wheel assemblies, artillery ammunition, $242,330.
National Acme Co., Cleveland, screw machines, $59,250.
National Tool Co., Cleveland, cutters and mills, $2283.96.
Newburgh Wire Works, Cleveland, manganese, molybdenum steel, $156,679.17.
Niles-Bement-Pond Co., Pratt & Whitney Division, West Hartford, Conn., gages, grinders, oil pumps, $60,567.17.
Noble & Westbrook Mfg. Co., Hartford, Conn., marking machines, $1960.
Norris Stamping & Mfg. Co., Los Angeles, cartridge cases, $69,297.42.
North American Iron & Steel Co., Brooklyn, N. Y., rolling doors, $3320.
Northwest Tool & Engineering Co., Milwaukee, gages, $1298.85.
Norton Co., Worcester, Mass., grinding wheels, $2783.10.
Oilgear Co., Milwaukee, pump for press, $4055.
O. K. Tool Co. Inc., Shelton, Conn., cutters and mills, $1316.
Onsrud Machine Works Inc., Chicago, machinery with complete equipment, $64,106.80.
Otis Elevator Co., Buffalo, gymnasticating machines, timing devices, pressure pump, steel castings, $25,494.14.
Otis Steel Co., Cleveland, steel, $3537.68.
Peelle Co., Brooklyn, N. Y., modernize elevator, $1321.
Penn Instrument Works, Philadelphia, snap gages, $1560.
Pennsylvania Forge Corp., Tacony, Philadelphia, steel bars and forgings, alloy

Heavy Gun Carriage Capable of 75 Miles an Hour



■ **Almost as long as a street car, this new gun carriage for a 155-millimeter field gun was given its first test in Chicago. Carriage can be towed at speeds up to 75 miles an hour and is considered the most mobile heavy gun in the world by ordnance officers. NEA photo**

steel forgings, $19,536.
Perfex Corp., Milwaukee, fuzes, $350,000.
Pipe Machinery Co., Cleveland, gages, $6705.06.
Plews Oiler Co., Minneapolis, oil cans, $2264.99.
Poor & Co., Canton Forge & Axle Works Division, Canton, O., drop forgings, $12,004.30.
Porter Forge & Furnace Inc., Everett, Mass., steel drop forgings, $2129.62.
Porter, H. K., Co. Inc., Pittsburgh, artillery ammunition, $440,940.94.
Precision Mfg. Co., New York, gages, $17,810; Philadelphia Division, gages, $24,349.
Pringle Electrical Mfg. Co., Philadelphia, power switchboards, $8990.
Production Tool & Die Co. Inc., Springfield, Mass., dies, gages, $9060.
Quality Hardware & Machine Corp., Chicago, furnish and install four motor drives, $1704.
Quality Tool & Die Co., Indianapolis, gages, $14,924.
Racine Tool & Machine Co., Racine, Wis., hack saws, $1673.90.
Rahaim Machine & Tool Co., Gardner, Mass., gages, $29,053.70.
Read Machinery Co. Inc., York, Pa., gun parts, $127,050.96.
Reed & Prince Co., Worcester, Mass., screws, $5145.
Remington Arms Co. Inc., Bridgeport, Conn., cartridges, $20,000.
Renninger & Graves, Philadelphia, volumetric developer, with Bruning model printer, $2560.
Republic Electric Co., Davenport, Iowa, lead encased cable, $12,532.80.
Republic Steel Corp., Buffalo, steel bar stock forgings, bar steel, $11,001.32.
Reynolds Engineering Co., Rock Island, Ill., gages, $14,497.
Reynolds Metals Co., Louisville, Ky., aluminum powder, $4050.
Ric-Wil Co., Barberton, O., plumbing supplies, $2681.74.
R. & M. Mfg. Co., Royal Oak, Mich., gages, $10,310.58.
Robbins & Myers Inc., Springfield, O., electric fans, $1313.65.
Rock Island Metal Foundry Co., Rock Island, Ill., bronze castings, castings and projectile hoists, $10,401.02.
Roebling's, John A., Sons Co., Philadelphia, galvanized wire, $1230.
Root, B. M., Co., York, Pa., universal saw benches, $3140.26.
Ryerson, Joseph T., & Son Inc., Chicago, steel, $1919.11.
Sheffield Gage Corp., Dayton, O., gages, $4052.
Shipley, W. E., Machinery Co., Philadelphia, automatic cartridge case end trimming machine, $4845.
Sidney Machine Tool Co., Sidney, O., heavy duty engine lathes, $8653.
Sier-Bath Gear Co. Inc., North Bergen, N. J., machining and cutting of teeth on pinion blanks, $30,800.
Singer Sewing Machine Co., Newark, N. J., sewing and drive equipment machines, $11,099.05.
Sipp-Eastwood Corp., Paterson, N. J., drills, holders and bits, $2377.
Smith, Thomas, Co., Worcester, Mass., soft steel discs, $7316.50.
Snap-On Tools Corp., Kenosha, Wis., commercial extensions, hinge handles, $5296.19.
Somerville Machine & Foundry Co., Somerville, Mass., aluminum bronze and bronze castings, $14,275.82.
Sperry Gyroscope Corp., Brooklyn, N. Y., torque converters, helmets, $8167.50.
Square D Co., Kollsman Instrument Division, Elmhurst, N. Y., compasses, $7200.
Standard Alloy Co., Philadelphia, annealing baskets, $12,600.
Standard Pressed Steel Co., Jenkintown, Pa., firing plugs, steel benches, $6102.
Steel, W. M., Co., Worcester, Mass., reaming machines, $20,500.
Suburban-Essex Machinists Inc., Orange, N. J., gages, $37,174.
Swind Machinery Co., Philadelphia, continuous pickling and rinsing unit, $5895.
Syracuse Supply Co., Syracuse, N. Y., head drill, spindle drill, $1002.
Taft-Peirce Mfg. Co., Woonsocket, R. I., tool room equipment, $1220.
Talon Inc., Meadville, Pa., gages, $1365.
Taylor-Wharton Iron & Steel Co., Easton, Pa., compressed gas cylinders, $8750.
Timken Detroit Axle Co., Wisconsin Axle Division, Oshkosh, Wis., parts for tanks, $1333.50.
Timken Roller Bearing Co., Canton, O., roller bearings, $7545.70.
Tinius Olsen Testing Machine Co., Philadelphia, testing machines, $8550.
Towmotor Co., Cleveland, lift and tractor trucks, tilting trucks, $16,454.87.
Tri-Metal Products Corp., Conshohocken, Pa., bronze castings, $9541.80.
Troy Belting & Supply Co., Troy, N. Y., cutters and mills, $3250.10.
Tungsten Electric Corp., Union City, N. J., tools, $33,437.47.
Turner Uni-Driver Co., Kansas City, Mo., gear box drives, $3321.40.
Ulmer, J. C., & Co., Cleveland, gages, $1008.
Ulmer, Theo. C., Co. Inc., Philadelphia, hardware, $1530.98.
Underwood Machinery Co., South Boston, Mass., pilot rammer, practice machine, $53,750.
Union Hardware Co., Torrington, Conn., rifle cleaning rods, $1950.
Union Twist Drill Co., Athol, Mass., cutting tools, twist drills, drills, $12,963.69.
United Shoe Machinery Corp., Beverly, Mass., steel drop forgings, $4692.
United States Metals Refining Co., Carteret, N. J., solder in bars, $1512.50.
Uranium Lighting Corp., New York, lighting fixtures, $3989.90.
U. S. Hoffman Machinery Corp., New York, laundry equipment, $2903.
Vanadium Corp. of America, Niagara Falls, N. Y., ferrovanadium, $28,000.
Vascoloy-Ramet Corp., North Chicago, Ill., tools, $12,300.
Veit & Young, Philadelphia, punches and tools, $21,575.
Vermont Tap & Die Corp., Lyndonville, Vt., hand taps, $1407.48.
Vinco Corp., Detroit, gages, $14,641.05.
Warner Electric Brake Mfg. Co., South Beloit, Ill., gun parts, $1553.75.
Warner & Swasey Co., Chicago, chucks for turret lathes, $1059.
Waterbury Clock Co., Waterbury, Conn., assemblies for flare fuze, $3960.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., assembly machines, corrugating machines, $38,766.
Watson-Stillman Co., Roselle, N. J., hydraulic presses, $1300.
Wellman, S. K., Co., Cleveland, brake lining and rivets, $1078.15.
Westinghouse Electric Mfg. Co., Westinghouse Lamp Division, Boston, fluorescent lamps, $1972.80.
White, Howard L., Brooklyn, N. Y., rifling head, $2950.
White, S. S., Dental Mfg. Co., Prince Bay, Staten Island, N. Y., shaft and casing tachometers, $2435.45.
Wilkins-Anderson Co., Chicago, balances, $1026.72.
Williams, J. H., & Co., Buffalo, forgings, wrenches, $24,636.01.
Wood, Alan, Steel Co., Conshohocken, Pa., steel, $2703.
Wright Aeronautical Corp., Paterson, N. J., parts for tanks, $49,338.12.
York Ice Machinery Corp., Philadelphia, furnish and install complete constant temperature cabinet, $1285.
Youngstown Sheet & Tube Co., Youngstown, O., seamless steel tubing, steel for gun mounts, $38,314.69.
Zimmerman Steel Co., Bettendorf, Iowa, steel castings, $14,731.77.
Zubles Bearing Co., Philadelphia, punches for bullet blank tools, $1278.

Medical Corps Awards

Bausch & Lomb Optical Co., Rochester, N. Y., laboratory equipment, $8255.04.
Bohannon, Wilson, Co., Marion, O., pliers and padlocks, $668.91.
Clay-Adams Co. Inc., New York, laboratory equipment, $12,450.
Cleveland Dental Mfg. Co., Cleveland, dental equipment, $1786.43.
Hamilton Mfg. Co., Two Rivers, Wis., dental cabinets, $56,286.
Picker X-Ray Corp., Cleveland, X-ray and field equipment, $126,217.79.
Standard X-Ray Co., Chicago, radiographic and fluoroscopic machines, $3996.
Thomas, Arthur H., Co., Philadelphia, laboratory equipment, $15,700.
Winkler Ice Machine Co., Philadelphia, refrigerating system, $7751.

Coast Artillery Corps Awards

Anaconda Wire & Cable Co., New York, cable, $3610.
Simplex Wire & Cable Co., Cambridge, Mass., cable, $5876.

Quartermaster Corps Awards

Altman-Coady Co., Columbus, O., storage buildings, test buildings and loading platform, Avon Signal Corps Depot, Kentucky, $445,731.
Chytraus, Enoch, Co., Salt Lake City, Utah, mess hall, Ft. Douglas, Utah, $10,233.
Coffey, T. E., & Co., Roanoke, Va., barracks, mess hall, officers' quarters and mess, recreation building, storehouse and administration building, Camp Lee, Virginia, $56,717.
Fritch, J. J., Construction Co., Dallas, Tex., recreation buildings, barracks at Camp Joseph T. Robinson, Arkansas, $300,440.
Fruehauf Trailer Co., Detroit, semi-trailers, $407,250.
General Motors Corp., New York, portable vehicle assembly plant equipment, $180,097.04.
Martell, F. H., Washington, officers' mess building, Arlington cantonment, Virginia, $14,573.
McKee, Robert E., El Paso, Tex., four barracks, Ft. Bliss, Texas, $36,700.
Mead & Mount Construction Co., Denver, five regimental chapels, magazines, Ft. Francis E. Warren, Wyoming, $121,200.
Moses, Charles S., Edgewater Park, N. J., sewage treatment plant, Ft. Dix, New Jersey, $129,000.
Noland Co., Washington, chains and tighteners, $22,946.45.
Nielsen, Erbentraut & Summers, San Jose, Calif., temporary housing and utilities, Ft. Mason, California, $56,600.
Pearson Construction Co. Inc., Benton Harbor, Mich., 34 temporary frame buildings, Ft. Benjamin Harrison, Indiana, $419,050.
Smythe & Co., Tacoma Park, Md., ten regimental chapels, Ft. George G. Meade, Maryland, $189,661.
Springfield Bros., Dalton, Ga., regimental chapel, Ft. Oglethorpe, Georgia, $18,192.
Steinle-Wolf Inc., Fremont, O., fire station and guard house, subguard house and main entrance gate, tool and equipment buildings, and fuse magazines, artillery repair building, instrument building and garage and shop, Erie proving ground, Ohio, $367,798.
Thompson, F. N., Raleigh, N. C., two barracks, Camp Davis, North Carolina, $16,300.
Timmons, George W., Columbus, O., temporary building, Ft. Hayes, Columbus, O., $20,878.
Upchurch Construction Co., Montgomery, Ala., regimental chapels, Ft. Benning, Georgia, $118,615.36.
Vizzini, Philip, Baltimore, regimental chapel, Holabird quartermaster depot, Baltimore, $19,742.
Welso Construction Co., Chicago, three

chapels, Ft. Sheridan, Illinois, $54,485.
Wood, Gar, Industries, Detroit, dump bodies, wrecker-bodies, $527,944.

Air Corps Awards

Aircooled Motors Corp., Syracuse, N. Y., engines, $256,670.65.
American-La France-Foamite Corp., Elmira, N. Y., oxygen cylinder assemblies, $108,145.12.
Arnold, Schwinn & Co., Chicago, chock assemblies, $27,582.48.
Bell Aircraft Corp., Buffalo, N. Y., airplanes and spare parts, $15,885,081.56.
Chicago Aerial Survey Co., Chicago, aircraft cameras, $126,100.
Curtiss-Wright Corp., Airplane Division, Buffalo, airplane maintenance parts, $7,809,597.
Douglas Aircraft Co. Inc., Santa Monica, Calif., airplanes and spare parts, $7,-843,010.69.
Fruehauf Trailer Co., Detroit, semi-trailer assemblies, $126,470.
Gem City Blue Print & Supply Co., Dayton, O., drafting equipment, $60,765.25.
General Fireproofing Co., Youngstown, O., steel shelving, $133,403.22.
General Motors Corp., Chevrolet Motor Division, Detroit, engines and spare parts, $89,075,000.
Greenfield Tap & Die Corp., Greenfield, Mass., dies, $10,385.65.
Lockheed Aircraft Corp., Burbank, Calif., airplanes and spare parts, $2,797,947.
North American Aviation Inc., Dallas, Tex., airplanes and spare parts, $57,-725,572.80.
Northrop Aircraft Inc., Hawthorne, Calif., airplanes and spare parts, $16,-287,134.
Republic Aviation Corp., Farmingdale, L. I., N. Y., airplanes and spare parts, $8,165,400.
Square D Co., Kollsman Instrument Division Elmhurst, N. Y., indicators and generators, $61,350.
Union Twist Drill Co., S. W. Card Division, Mansfield, Mass., dies, $25,138.55.
United Aircraft Corp., Hamilton Standard Propellers Division, East Hartford, Conn., 3-blade propellers, $217,922.02.
Vultee Aircraft Inc., Downey, Calif., airplanes and spare parts, $31,619,280.
Wright Aeronautical Corp., Paterson, N. J., aeronautical engines, $218,382.45.

Signal Corps Awards

Connecticut Telephone & Electric Corp., Meriden, Conn., headsets, test sets, $42,623.60.
Eureka Vacuum Cleaner Co., Detroit, recognition devices, $250,792.
Graybar Electric Co. Inc., Chicago, telephones, $46,248.
Hallicrafters Co., Chicago, radio receivers, $944.40.
Mallory, P. R., & Co. Inc., Indianapolis, vibrators, $12,740.
National Co. Inc., Malden, Mass., radio receivers, $12,154.68.
North Electric Mfg. Co., Galion, O., head and chest sets, $53,899.
Parish Pressed Steel Co., Reading, Pa., reels, $139,958.
Phelps Dodge Copper Products Corp., Yonkers, N. Y., telephone wire with reels, $342,975.
United Transformer Corp., New York, coils, $85,000.
Whitney Blake Co., New Haven, Conn., wire with reels, $241,175.

Corps of Engineers Awards

Aqua Systems Inc., New York, gasoline storage and dispensing system, Baton Rouge airbase, Louisiana, $99,762; air corps gasoline fueling system, Tallahassee, Fla., municipal airport, $103,-991.
Bray, F. L., Construction Co., Mobile, Ala., equipment repair building, Brookley field, Mobile, Ala., $239,448.
Buda Co., Harvey, Ill., earth augers, $121,360.68.
Carver Pump Co., Matherville, Ill., pumping sets, $28,729.50.
Columbus Iron Works Co., Columbus, Ga., garment storage room, Lawson field, Ft. Benning, Georgia, $4425.
Crown Iron Works Co., Minneapolis, ponton sets, $41,528.
Department of Water & Power, Los Angeles, extension of underground power and telephone conduit system, Mines field, Los Angeles, $5000.
General Motors Corp., Pontiac Division, Detroit, station wagon, Pine camp, New York, $897.24.
Giles & Ransome, Philadelphia, diesel tractor equipped with bulldozer, Cape Henlopen, Delaware, $9275.
Giuliano, Felix, Brooklyn, N. Y., basic lighting system, Millville airport, Cumberland county, New Jersey, $15,000.
Gladding, McBean & Co., Seattle, sewer pipe, Elmendorf field, Anchorage, Alaska, $14,448.75.
Gurley, W. & L. E., Troy, N. Y., engineers' transits, $101,480.
Hillstrom, J. W. & J. R., Marshfield, Oreg., single screw steam dredge-tender, $727,-000.
Hime, J. R., Electric Co., Palm Beach, Fla., airport lighting system, Melbourne-Eau Gallie airport, Brevard county, Florida, $17,852.80.
Ingersoll-Rand Co., New York, nail drivers, saws, air compressors, $20,604.72.
LeRoi Co., Milwaukee, air compressors, $106,330.
Lockwood, C. W., Hampton, Va., armament and instrument inspection and adjustment building, Langley field, Virginia, $137,713.
Lord & Burnham Co., Irvington, N. Y., footbridges, $62,667.
Nelson, H. B., Construction Co., Atlanta, Ga., airport lighting, Charleston, S. C., airport, $21,910.
Onan, D. W., & Sons, Minneapolis, generator sets, $171,950.
Powers & Archibald Inc., West Palm Beach, Fla., grading and paving runways, South Dade county airport, Homestead, Fla., $223,831.20.
"Quick-Way" Truck Shovel Co., Denver, truck-cranes, $361,422.16.
Rearwin Aircraft & Engines Inc., Fairfax airport, Kansas City, Kans., compression riveters, aircraft assembly plant, Kansas City, Mo., $8535.46.
Smith, C. O., & Co., Hazlehurst, Ga., two recreation buildings, municipal airport, Jacksonville, Fla., $4200.
Somerville, Thomas, Co., Washington, pipe fittings and wrenches, $6577.29.
Thomason, M. R., Montgomery, Ala., field lighting system, Alvin Callender airport, Belle Chasse, Plaquemines Parish, Louisiana, $19,943.
Tophams Inc., Washington, ponton sets, $66,274.
Wallace & Tiernan Co. Inc., Belleville, N. J., water purification units, $149,-604.45.
Wold, Peter, Seattle, motorship FERN, Annette Island, Alaska, $40,000.
Wyman & Simpson Inc., Augusta, Me., runways, Augusta airport, $228,505.

Los Angeles Yard To Build $4,000,000,000 Worth of Ships

■ **Unused land six months ago, this tip of Los Angeles Harbor's Terminal Island is rapidly becoming a huge production base which eventually will turn out $4,000,000,000 worth of ships. California Shipbuilding Corp. already has completed 11 new ways and will launch the first of 55 vessels next December. In the background, scores of oil derricks are visible. NEA photo**

$120,000,000 U. S. Orders For Aluminum in Canada

TORONTO, ONT.

■ United States government recently placed with Aluminum Co. of Canada Ltd., Montreal, Que., an additional order for 170,000 metric tons of aluminum at $126,000,000. This supplements a prior purchase to the value of $60,000,000. Contract calls for delivery in 1942-43-44. Expansions totaling about $60,000,000 and located principally in the Quebec area are planned by the company to handle the orders, and those

(*Please turn to Page* 117)

Uncle Sam's Factory O.K.,

But How About Front Office?

■ CURRENT news and market reports from the iron, steel and metalworking industries indicate that the confusion over priorities, prices and other factors regulated by government edict is increasing rapidly.

Much of the trouble is attributed to the ineptness of individuals in government bureaus who do not understand industrial operations and to the lack of co-ordination in the defense organization due to the lack of concentrated authority.

That these deficiencies exist in the defense set-up now is a matter of almost universal opinion.

• • •

Industrialists, who sensed these defects many months ago, no longer are alone in their pleas for corrective action. The house military affairs committee, a majority of whose members are ardent supporters of most administration policies, has issued a report based upon a searching investigation which criticizes the defense organization severely— chiefly on the score that the entire project has no authoritative head. Numerous other authorities, in and out of government, now agree with industrialists in their clamor for a more practical set-up for defense.

• • •

Washington's only response to these protests has been a minor revamping of jobs and functions in OPM. This will avail little, because the fault lies higher up in the organization. In fact, executive action by the President is the only thing that can correct the situation.

Meanwhile, the demoralizing effect of this confusion is becoming more disastrous every minute. The results are not apparent in Washington, because Washington, like the front office of a large manufacturing establishment, knows only vaguely what is going on out in the shops where the real work is being done.

Out in the front lines of industry the consequences of incompetency in the front office stand out like sore thumbs. The officious orders which arbitrarily allocate precious material to destinations where it cannot be used for months, the edicts on prices which defeat their own purpose, the insistence on the part of some army or navy officials for meticulous adherence to trivial technicalities, the months-long waits for decisions on important details— all of these and more aggravate the men who are trying so hard to meet production schedules.

• • •

But that isn't all. Scores of smaller companies are being squeezed out of business because of inability to procure material. Defense production is being slowed up by misapplication of supplies. The entire defense program is in danger of becoming more chaotic before it gets better.

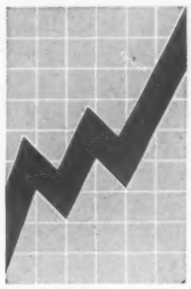
It would be so easy to right matters quickly that one wonders why the President does not act. All he has to do is to name one good man to head the defense organization—as President Wilson did in naming Bernard M. Baruch in 1918.

It is not fair to dissipate efficiency on the production line through inefficiency at the top.

E. L. Shaner

EDITOR-IN-CHIEF

The *BUSINESS TREND*

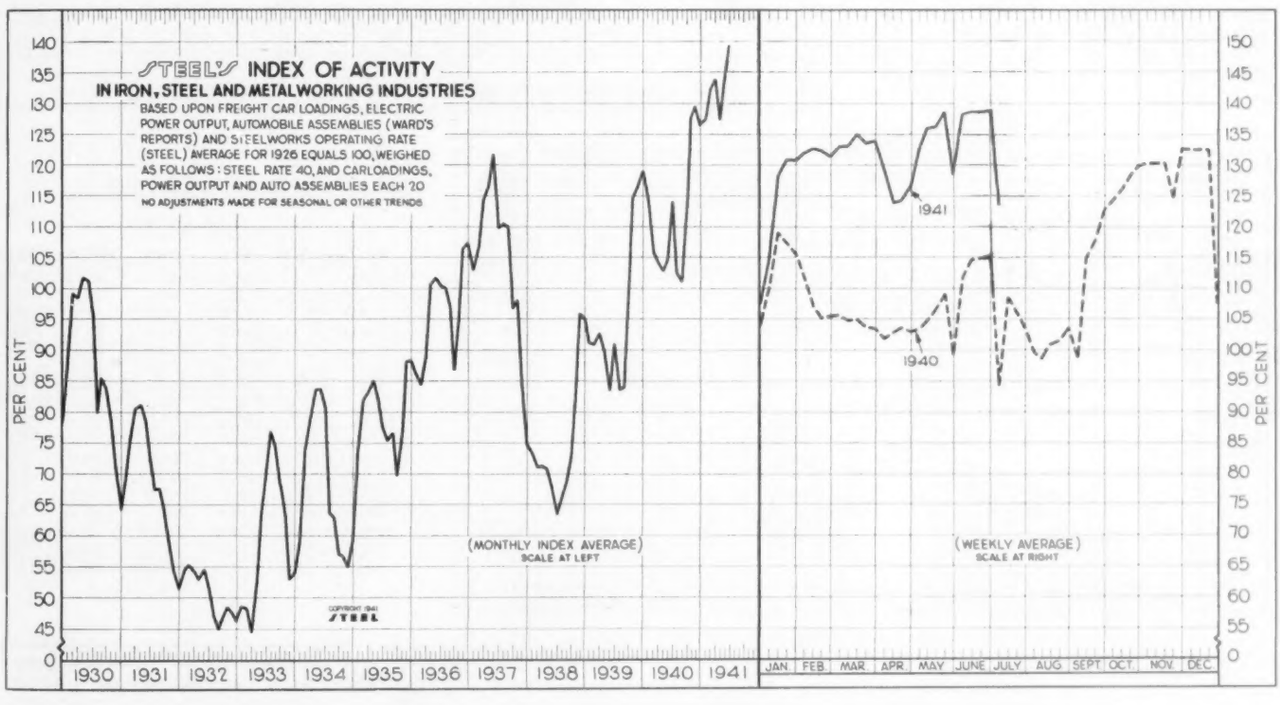


Activity Index Declines During Holiday Week

■ REFLECTING the July 4 holiday interruption, STEEL'S index of activity declined sharply to 123.0 during the latest period. This represents a drop of 15.8 points from the peak level of 138.8 recorded in the previous week. In the comparable holiday period last year the index declined 21.1 points, while in 1937 and 1929 it receded 11.5 and 12.2 points, respectively.

Each of the industrial indicators composing the index declined during the latest week. The national steel rate eased three points to 96.5 per cent, while automobile production totaled 96,457 units, compared with 127,926 the preceding week. Revenue freight carloadings were reduced from the highest level recorded since the week of Dec. 14, 1929 to about 740,000 cars. Preliminary estimate of electric power consumption for the week of July 5 was placed at 2,870,000,000 kilowatts, off from the all-time peak of 3,120,780,000 established the preceding week.

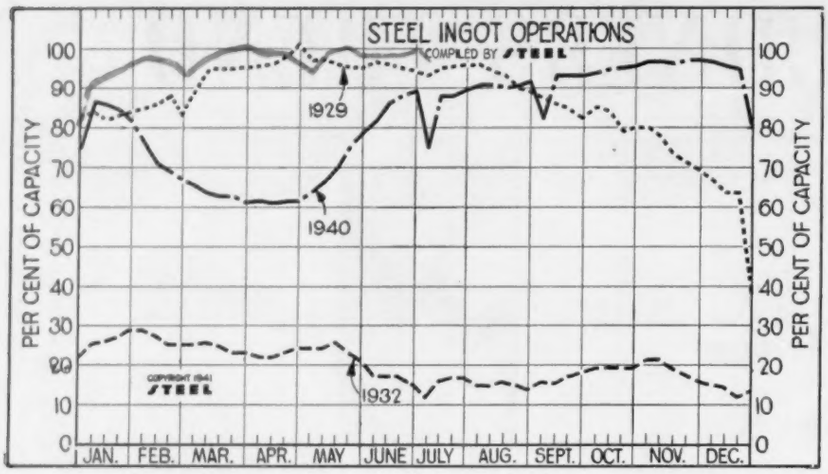
The rebound from the holiday interruption in most industrial lines has been encouraging. Operations generally should hold at current practical capacity levels for some months, reflecting the large order backlogs accumulated and expanding defense needs.


STEEL'S INDEX OF ACTIVITY
IN IRON, STEEL AND METALWORKING INDUSTRIES
BASED UPON FREIGHT CAR LOADINGS, ELECTRIC POWER OUTPUT, AUTOMOBILE ASSEMBLIES (WARD'S REPORTS) AND STEELWORKS OPERATING RATE (STEEL) AVERAGE FOR 1926 EQUALS 100, WEIGHED AS FOLLOWS: STEEL RATE 40, AND CARLOADINGS, POWER OUTPUT AND AUTO ASSEMBLIES EACH 20
NO ADJUSTMENTS MADE FOR SEASONAL OR OTHER TRENDS
PER CENT
(MONTHLY INDEX AVERAGE) SCALE AT LEFT
(WEEKLY AVERAGE) SCALE AT RIGHT
1941
1940
1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC

STEEL'S index of activity declined 15.8 *points to* 123.0 *in the week ended July* 5:

Week Ended	1941	1940
April 19	124.2	103.4
April 26	126.5	102.8
May 3	132.6	103.3
May 10	135.9	104.8
May 17	136.1	106.8
May 24	138.6	109.1
May 31	128.4	99.2
June 7	138.4	111.9
June 14	138.7	114.6
June 21	138.7	114.8
June 28	138.8	115.3
July 5	123.0	94.2

Mo. Data	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930
Jan.	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6
Feb.	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2
March	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4	98.6
April	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7
May	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2
June	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8
July	.....	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9
Aug.	.....	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4
Sept.	.....	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7
Oct.	.....	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8
Nov.	.....	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0
Dec.	.....	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3



Steel Ingot Operations

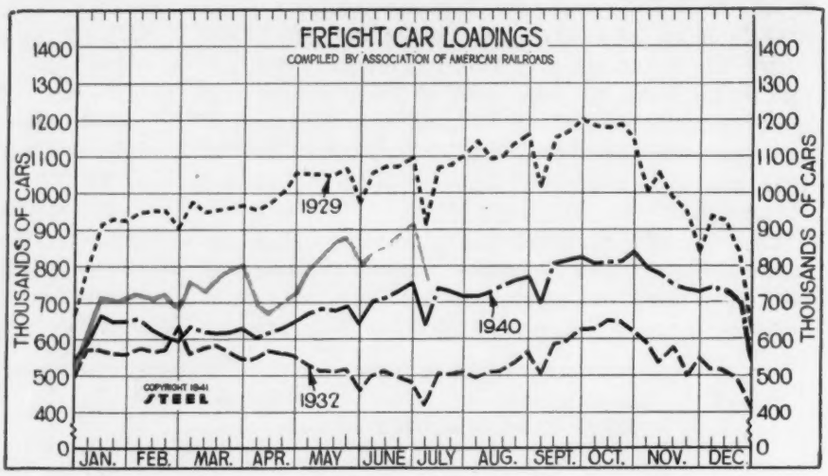
(Per Cent)

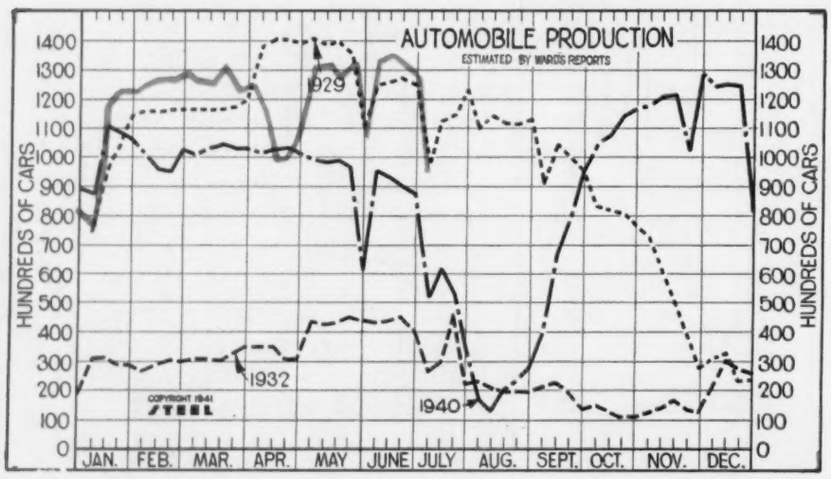
Week ended	1941	1940	1939	1938
July 5....	96.5	75.0	42.0	24.0
June 28....	99.5	89.0	54.0	28.0
June 21....	99.0	88.0	54.5	28.0
June 14....	99.0	86.0	52.5	27.0
June 7....	99.0	81.5	53.5	25.5
May 31....	99.0	78.5	52.0	25.5
May 24....	100.0	75.0	48.0	28.5
May 17....	99.5	70.0	45.5	30.0
May 10....	97.5	66.5	47.0	30.0
May 3....	95.0	63.5	49.0	31.0
April 26...	96.0	61.5	49.0	32.0
April 19...	98.0	61.5	50.5	32.5
April 12...	98.0	61.0	51.5	32.0
April 5...	98.0	61.5	53.5	32.0
March 29..	99.5	61.0	54.5	36.0
March 22..	99.5	62.5	55.5	35.0
March 15..	98.5	62.5	56.5	32.0

Freight Car Loadings

(1000 Cars)

Week ended	1941	1940	1939	1938
July 5.....	740	636	559	501
June 28.....	909	752	666	589
June 21.....	886	728	643	559
June 14.....	863	712	638	556
June 7.....	853	703	635	554
May 31.....	802	639	568	503
May 24.....	886	687	628	562
May 17.....	864	679	616	546
May 10.....	837	681	555	542
May 3.....	794	666	573	536
April 26.....	722	645	586	543
April 19.....	698	628	559	524
April 12.....	680	619	548	538
April 5.....	682	603	535	522
March 29....	792	628	604	523
March 22....	769	619	605	573
March 15....	759	619	595	540





Auto Production

(1000 Units)

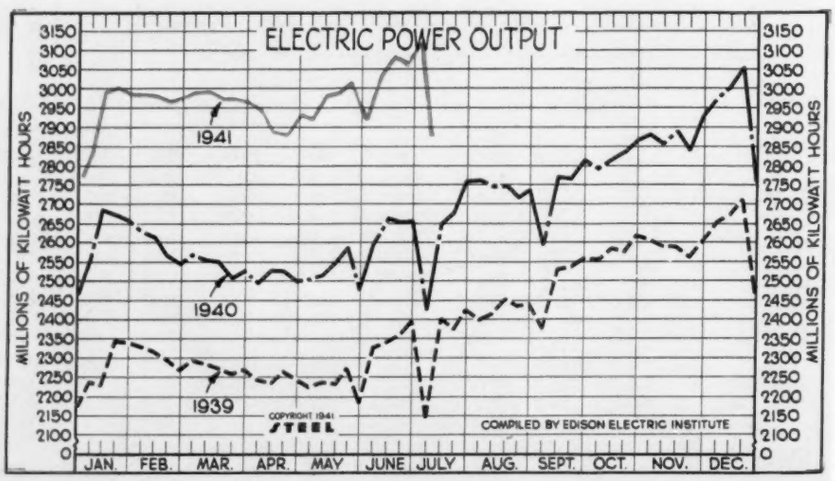
Week ended	1941	1940	1939	1938
July 5....	96.5	52.0	42.8	25.4
June 28....	127.9	87.6	70.7	40.9
June 21....	133.6	90.1	81.1	40.9
June 14....	134.7	93.6	78.3	41.8
June 7....	133.6	95.6	65.3	40.2
May 31....	106.4	61.3	32.4	27.0
May 24....	133.6	96.8	67.7	45.1
May 17....	127.3	99.0	80.1	46.8
May 10....	132.6	98.5	72.4	47.4
May 3....	130.6	99.3	71.4	53.4
April 26...	108.2	101.4	86.6	50.8
April 19...	99.9	103.7	90.3	60.6
April 12...	99.3	101.9	88.1	62.0
April 5....	116.3	101.7	87.0	61.0
March 29..	124.2	103.4	86.0	57.5
March 22..	123.8	103.4	89.4	56.8
March 15..	131.6	105.7	86.7	57.6

Electric Power Output†

(Million KWH)

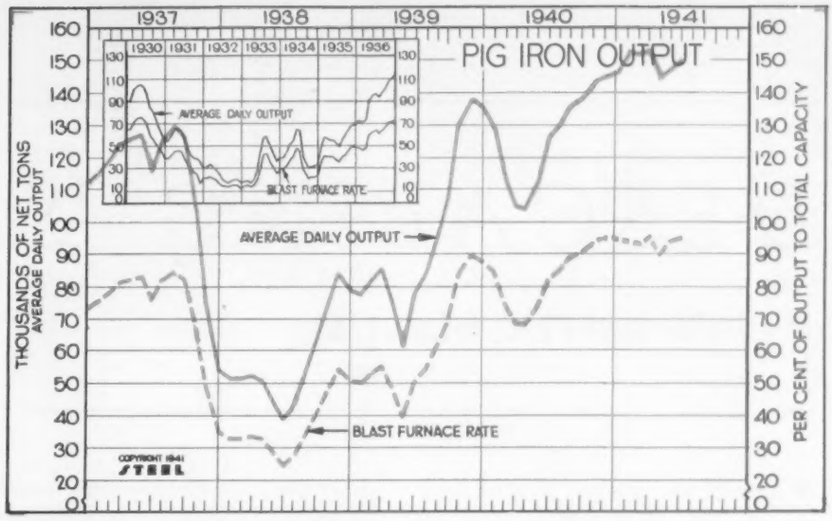
Week ended	1941	1940	1939	1938
July 5.....	2,870	2,425	2,145	1,937
June 28.....	3,121	2,660	2,396	2,074
June 21.....	3,056	2,654	2,362	2,082
June 14.....	3,057	2,665	2,341	2,051
June 7.....	3,042	2,599	2,329	2,057
May 31.....	2,924	2,478	2,186	1,937
May 24.....	3,012	2,589	2,278	2,031
May 17.....	2,983	2,550	2,235	2,024
May 10.....	2,975	2,516	2,239	2,019
May 3.....	2,915	2,504	2,225	1,992
April 26.....	2,926	2,499	2,244	1,996
April 19.....	2,874	2,529	2,265	2,010
April 12.....	2,882	2,530	2,235	2,016

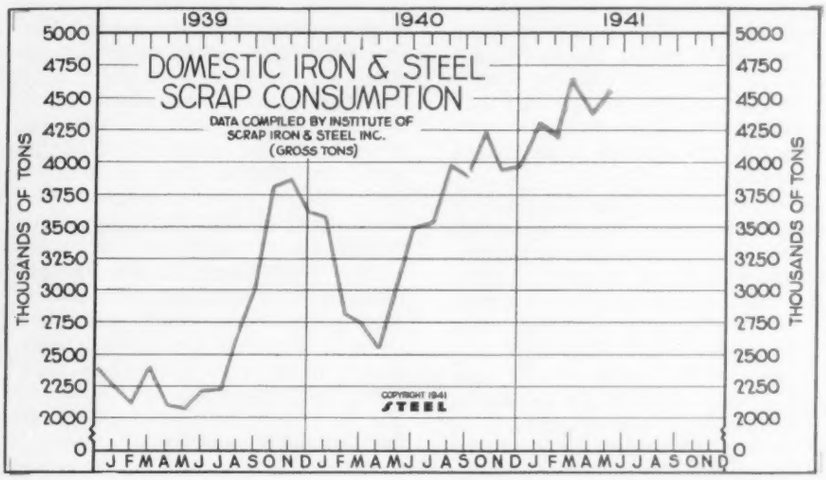
†New series: Includes additional governmental and power generation not previously reported.



Pig Iron Production

	Daily average —Net Tons—			Blast furnace —Rate (%)—		
	1941	1940	1939	1941	1940	1939
Jan.	150,524	129,825	78,596	95.5	85.4	51.0
Feb.	150,244	113,943	82,407	95.3	75.0	53.5
Mar.	151.707	105,502	86,465	96.3	69.5	56.1
Apr.	144,685	104,635	76,732	91.8	68.9	49.8
May	148.262	112,811	62,052	94.1	74.2	40.2
June	151,701	127,103	79,125	96.3	83.6	51.4
July	.....	130,984	85,121	....	86.1	55.0
Aug.	.....	136,599	96,122	....	89.9	62.4
Sept.	.....	139,085	107,298	....	91.5	69.7
Oct.	.....	143,152	131,053	....	94.2	85.2
Nov.	.....	146,589	138,883	....	96.4	90.3
Dec.	.....	146,544	136,119	....	96.4	88.5
Ave.	.....	128,128	86,375	....	84.3	62.6




1939
1940
1941
DOMESTIC IRON & STEEL SCRAP CONSUMPTION
DATA COMPILED BY INSTITUTE OF SCRAP IRON & STEEL INC.
(GROSS TONS)
THOUSANDS OF TONS
THOUSANDS OF TONS
COPYRIGHT 1941 STEEL
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Iron and Steel Scrap Consumption

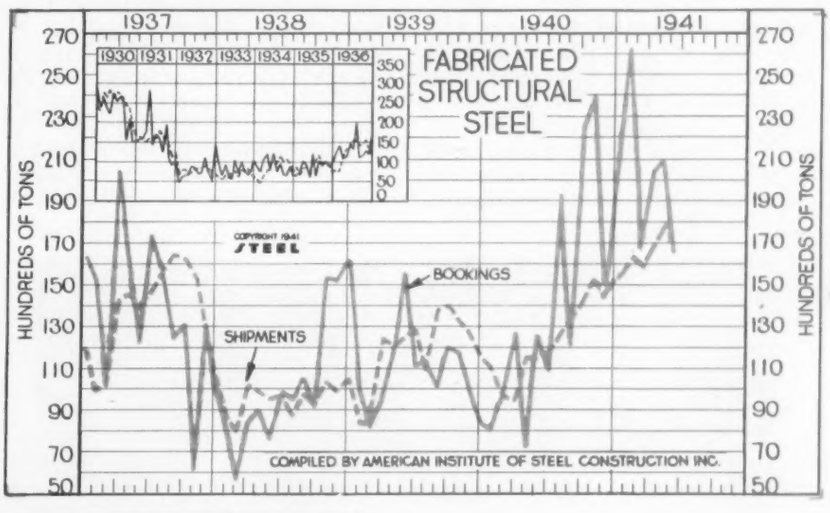
(Gross Tons)

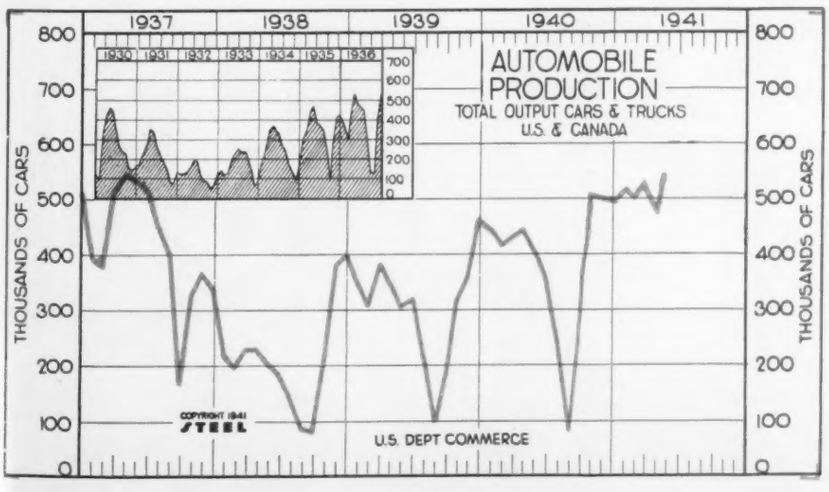
	1941	1940	1939	1938
		(000 omitted)		
Jan.	4,278	3,581	2,257	1,331
Feb.	4,172	2,812	2,124	1,306
Mar.	4,662	2,728	2,419	1,543
Apr.	4,406	2,548	2,114	1,477
May	4,609	3,061	2,079	1,387
June	.....	3,482	2,221	1,257
July	.....	3,526	2,247	1,520
Aug.	.....	3,968	2,675	1,953
Sept.	.....	3,876	3,018	2,218
Oct.	.....	4,233	3,809	2,393
Nov.	.....	3,922	3,858	2,732
Dec.	.....	3.950	3,613	2,411
Total ..	.....	41,687	32,434	21,528
Mo. Av. ..	.....	3,474	2,703	1,794

Fabricated Structural Steel

(1000 tons)

	Shipments			Bookings		
	1941	1940	1939	1941	1940	1939
Jan.	164.6	110.9	84.3	281.2	81.7	101.7
Feb.	161.4	97.2	84.4	173.6	98.9	82.7
Mar.	170.2	95.9	125.3	206.1	128.3	95.1
Apr.	181.7	116.3	120.9	212.3	73.8	118.3
May	172.7	115.6	125.9	165.2	126.8	156.9
June	119.1	130.1	.....	109.7	111.6	
July	127.1	110.5	.....	194.9	114.1	
Aug.	134.9	139.7	.....	122.5	100.9	
Sept.	142.8	140.8	.....	225.5	121.4	
Oct.	153.2	133.8	.....	233.1	118.8	
Nov.	147.0	128.2	.....	141.9	99.3	
Dec.	155.5	116.2	.....	203.1	84.4	
Tot.	1515.5	1440.1	.....	1748.1	1305.0	





Automobile Production

(Unit: 1000 Cars)

	1941	1940	1939	1938	1937
Jan.	524.1	449.3	357.0	227.1	399.2
Feb.	509.2	421.8	317.5	202.6	383.9
March	533.9	440.2	389.5	238.6	519.0
April	489.8	452.4	354.3	238.1	553.4
May	545.3	412.5	313.2	210.2	540.4
June	.....	362.6	324.2	189.4	521.1
July	.....	246.2	218.5	150.4	456.9
Aug.	.....	89.9	103.3	96.9	405.1
Sept.	.....	284.6	192.7	89.6	175.6
Oct.	.....	514.4	323.0	215.3	338.0
Nov.	.....	511.0	370.2	390.4	376.6
Dec.	.....	506.9	469.0	407.0	346.9
Ave.	.....	391.0	311.0	221.3	418.0

DESCALING SHELL

by abrasives blasting

■ AIR IS the most expensive item in the cost of descaling shell by blasting. Most shell-blasting machines prior to a year ago used stationary air-blast jets over which the shell bodies were placed in a stationary position. Each shell then was blasted inside by a single stationary air-blast jet. If it were necessary to blast the outsides, other air-blast jets were used for this operation, also.

About a year ago, the American Foundry Equipment Co., Mishawaka, Ind., developed a shell-blasting machine incorporating features which greatly reduce the cost of air.

This unit consists essentially of a conveyor from which are suspended shell hangers at intervals. The surrounding housing is cut away at one side to permit loading and unloading the hangers, and this opening is sealed with split rubber curtains to prevent escape of abrasives. See Fig. 1.

Inside the housing is located the blasting mechanism. This consists of air-blast jet nozzles, generally not more than two or three, spaced apart the same distance as the shell hangers on the conveyor and pointing upward at *different angles*, as shown at "X," Fig. 2. These blast the inside surface of the shell. An airless Wheelabrator blasting wheel, "Y," Fig. 2, located to one side and further along the conveyor line blasts off the outside surfaces of the shell.

Spent abrasives drop to a hopper below, thence are carried by bucket elevator to the abrasives separator at "A," Fig. 3, and thence by gravity to the air-blast tank "B," Fig. 3, and on to the airless Wheelabrator blasting wheel "Y," Fig. 2.

If the shell is too heavy for handling by one man, it can be loaded and unloaded by a mechanical loading device. See Fig. 4. The cabinet is connected to a ventilating system for drawing off dust and fines. The machine can be furnished without the airless Wheelabrator blast wheel if the job does not require blasting outside surfaces.

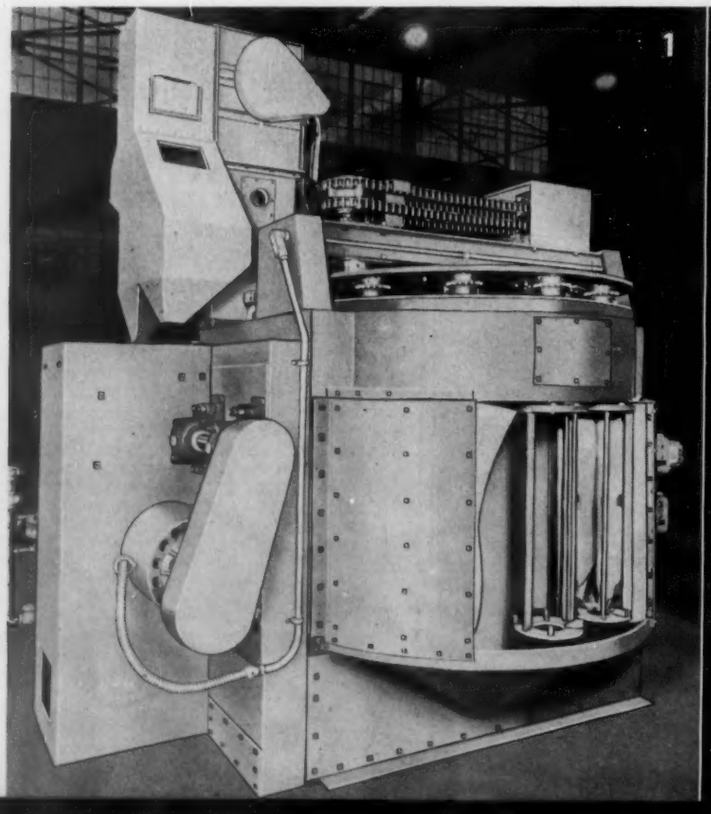
Operation: The operator loads the shell on the hangers with the open ends downward. As these hangers move into the cabinet, they spin around on their axis and are spotted over the successive air-blast jets for a time interval determined by trial. This blasts out the inside scale. As one set of shell is being spotted over the jets, the preceding set is spinning before the airless Wheelabrator blast wheel to remove the outside scale. When a hanger emerges from the cabinet at the completion of the cycle, the blasted shell is removed and replaced by an unblasted shell.

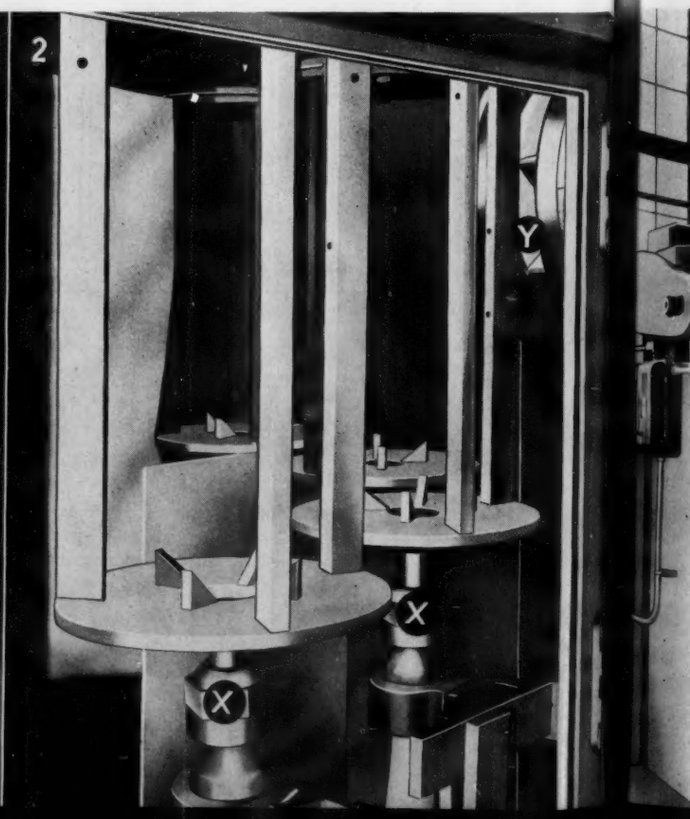
Principal design features which reduce air consumption are these:

The shell hang in an upright position with open ends downward. This permits the discharged abrasives to drop out freely by gravity. Hence there is no build-up of abrasives inside the shell and no chance for abrasives to protect the scale from the blast action.

While shell are spotted over successive air-blast jets and before the airless blast wheel, they are spun around so all surfaces are presented to the blast action.

Each of the blast nozzles is directed toward the inside of the shell at a different angle. This results in more parts of the surface being blasted and thus provides





greater coverage than if only a single stationary nozzle in one position were used.

The blast is continuous. It requires only a few seconds for a hanger to pass from one air-blast jet station to the next. If, during this short interval, the blast was stopped, the compressed air in the tank and lines would be discharged automatically through pop-off valves into the open and lost. Otherwise the lines would clog with abrasives.

Upon restarting the blast, however, several seconds would be required to obtain a steady flow of abrasives through the nozzle jets.

Such loss in blast efficiency is eliminated by the continuous blast here. The airless blast wheel for cleaning the outside surfaces reduces the power consumption by as much as 90 per cent as compared to air blast, a further important saving.

The conveyor timing gives constant output. A shell hanger emerges from the cabinet every so many seconds, and the cleaned shell must be replaced by an uncleaned shell.

Comparison of air consumption and cost, blasting insides only: A recent publication described a non-spinning hanger-type air-blast machine blasting only the insides of 75-millimeter shell. Each shell was placed over a single nozzle and remained in a stationary position until the inside was satisfactorily blasted. Eight ⅜-inch nozzles at 90 pounds pressure were used. Hourly consumption was 100,800 cubic feet of air. Allowing for 25 per cent shut down time of nozzles during loading and unloading, actual hourly consumption was 75,000 cubic feet of air. At the accepted figure of 5 cents per thousand cubic feet, the hourly cost for air was $3.75. With the production given of 125 shell per hour, air cost there amounted to 3 cents per shell.

By JOHN D. ALEXANDER

Cleveland Representative
American Foundry Equipment Co.

TABLE I—Data on Shell Blasting

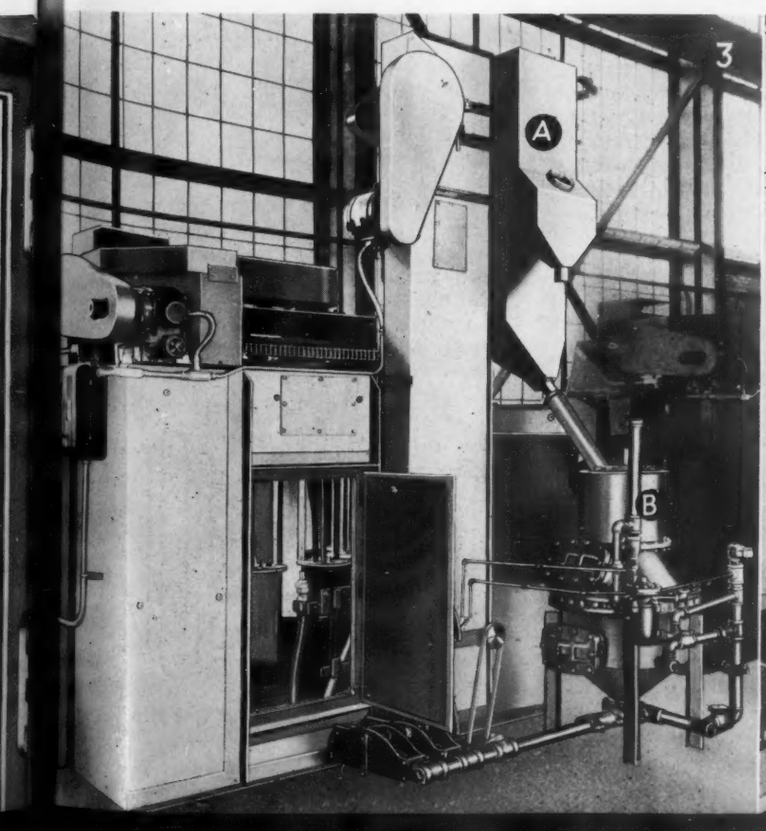
Size of Shell	No. Air Blast Nozzles at 90 lbs.	Production Per Hour	Air Required (Allowing 1/16" Nozzle Wear)
60-millimeter	five 7/16"	600	725 to 1050 cfm.
75-millimeter	three 3/8"	250	630 to 855 cfm.
90-millimeter	three 3/8"	180	630 to 855 cfm.
105-millimeter	three 3/8"	150	630 to 855 cfm.
5-inch Anti-aircraft	three 3/8"	120	630 to 855 cfm.
155-millimeter	three 3/8"	80	630 to 855 cfm.

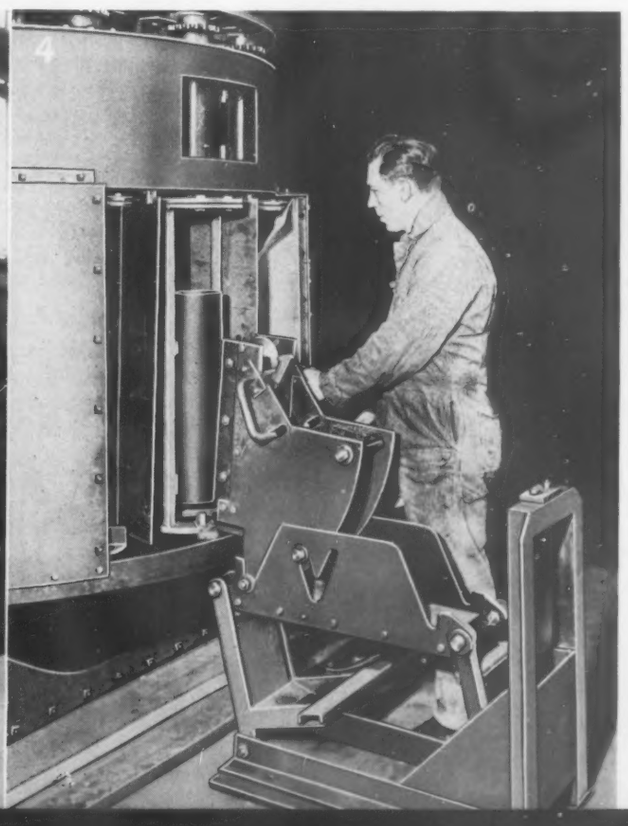
The American spinning hanger-type shell blasting cabinet described in this article—using only three ⅜-inch nozzles at 90 pounds pressure is blasting the insides of two-hundred-fifty 75-millimeter shell per hour. Hourly air consumption is only 37,800 cubic feet, and the air cost figures on the same basis as above is only $0.00756 per shell. This new design thus has reduced the air consumption by 75 per cent, or by at least 2 cents per shell.

On the basis of 1,000,000 shell, this reduction amounts to a saving of $20,000. The saving would be much greater than this if the outsides of the shell required blasting also and the airless blast wheel were used for this purpose instead of air-blast nozzles.

Complete operating cost of removing scale in American shell-blasting cabinets on a basis of two-hundred-fifty 75-millimeter shell per hour, with labor at 75 cents per hour, power at 1½ cents per kilowatt-hour and abrasives at 80 cents per ton, including maintenance (parts and labor), abrasives, power and operating labor can be estimated at: $0.0132 per shell for blasting insides only; $0.0168 per shell for blasting both insides and outsides.

It should be emphasized that the maximum savings in blasting costs and in air compressor investment made possible by this improved equipment will only be attained when an appreciable quantity of shell is to be handled. In such a case, the somewhat higher initial cost is more than compensated for by the lower operating costs.





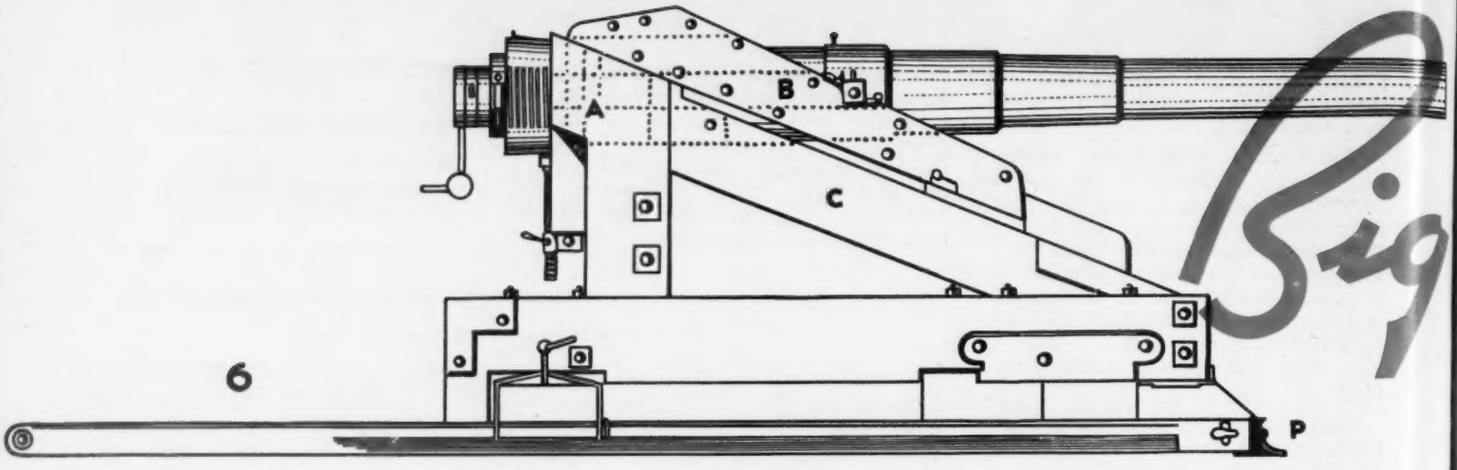


Fig. 6—Armstrong gun mounted for naval service. A is breech stopper; B, the upper carriage which recoils on the incline C; p, the pivot bolt which connects the Armstrong carriage with the common slide

■ ONE OF my very early recollections and one which apparently made a deep impression is the story of the untimely death of James the Second of Scotland, killed by the bursting of a cannon at the siege of Roxburgh castle on Aug. 3, 1460. I believe the gun was constructed of iron bars bound with hoops after the fashion of a barrel, a common construction in those days. See Fig. 1.

Later as the art of casting was developed, the typical field piece of the early sixteenth century consisted of a short, small caliber, smooth bore weapon, cast in bronze or iron. Contrary to the general impression, breech loaders are found among the earliest cannon, the principles of their action being essentially those of our latest designs embodying the sliding block. These early breech loaders did not survive, however, because of their lack of strength, and as late as the days of Nelson and Bonaparte, wars were fought with cannon whose essential characteristics had not changed in more than 300 years.

Da Vinci, Again: Once more we turn to the notes left by Leonardo da Vinci for the earliest proposal to wind the barrel with wire to increase its strength and to close the open breech with a screwed block. The latter idea arose in part from the desirability of casting the barrel with both ends open so the position of the core might be controlled better; and also to facilitate loading. This plan is now universally adopted (if we exclude our trench mortars). In our most recent applications of the steel founders' art, guns are made by centrifugally casting the molten metal in a rotating mold.

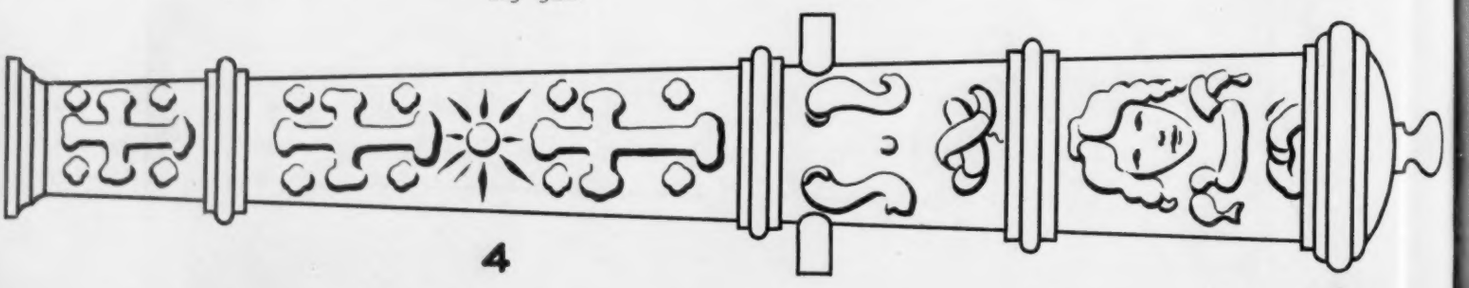
One of the earliest forms of cannon resembled an apothecary's mortar, whence the name of the modern piece is derived. See Fig. 3. These somewhat erratic devices fired a stone shot and, with the introduction of the cast iron projectile, were largely superseded by the culverin, Fig. 4,—the prototype of the modern gun. It employed a considerable charge of powder and had a high muzzle velocity for its time. The culverin was later modified by shortening the extremely long barrel which ancient artillerists believe necessary for long range shooting and so it became the howitzer, named after the German, Haubitz. The culverin retained for service in its own sphere of comparatively long range fire.

Naval guns of the period were simply constructed and so remained down to the middle of last century when the "rifle" was introduced. The history of this long and rather arid stretch in the theory and practice of gunnery is a somewhat tedious story of the influence of the various factors of caliber, length, powder charge and projectile density on penetrative and destructive power of the shot, enlivened here and there by excursions into the more exciting possibilities of "monster" guns as much as 8 and even 10 inches in diameter!

In 1842-3 the Pasha of Egypt had built in England a 10-inch gun, 12 feet long, weighing over 12 tons and projecting a solid shot of 128 pounds or a shell of 82 pounds. Under test, the Pasha's gun fired the 128-pound shot a distance of 4669 yards with 26 pounds of powder, when elevated 20 degrees, the range when shell was used being somewhat less (3440 yards) and the powder charge 16 pounds. In 1845 there was forged at Liverpool for the United States steam frigate PRINCETON a gun of 12-inch caliber, 13 feet long which fired a solid shot weighing 213 pounds. This gun was intended to replace one made of wrought iron bars welded together and fortified with hoops of the same material which had burst in service, killing several persons including the Secretary of State. The contrast between the weights of modern projectiles for guns of this caliber and the attainable ranges with modern propellants and rifled barrels is indeed striking.

Rifled Barrels: Modern gunnery began with the introduction of the rifled barrel in 1854 when William George Armstrong (later Sir William) of Newcastle, England, submitted to the Duke of Newcastle, then minister of war, a proposal for a rifled cannon which was apparently approved, for the gun was constructed the following year and

Fig. 4—The use of cast-iron projectiles led to the development of the culverin, a much stronger and more substantial weapon—the forerunner of the modern big gun



Guns — Ancient and Modern

By ARTHUR F. MACCONOCHIE
Head, Department of Mechanical Engineering
University of Virginia
University Station, Va.

Here Professor Macconochie tells about early bronze and iron guns; invention of the wire wound guns and screwed breech block by Leonardo da Vinci; early guns including the mortar, the culverin and the howitzer; invention of the rifled barrel—the Armstrong gun; distribution of hoop stress in a thick cylinder; methods employed to reduce stress variations; modern wire wound, built-up and radially expanded guns; considerations governing gun design

This Is Number 22 in a Series on Ordnance and Its Production, Prepared for STEEL, *by Professor Macconochie*

became the subject of a long series of experiments ultimately leading to the general introduction of the weapon into the British service. This gun, Fig. 5, had a lining of steel with the outer tube of wrought iron applied in a twisted or spiral form after the manner of a fowling piece. The bore was about 2 inches in diameter and was rifled with numerous small grooves into which the lead coating of the projectile fitted to form the gas check and to provide the rotary drive at one and the same time.

The projectile was of solid cast iron, 6½ inches long and weighing 5 pounds, the powder charge required being about 10 ounces. This gun fired its shot through six layers of rock elm composing a timber butt at a range of 1500 yards. In later models the steel lining was dispensed with on account of difficulties in manufacture and uncertainty as to its soundness, wrought iron being substituted by combining in one mass the various tubes made from twisted iron bars welded together at the edges by hammering.

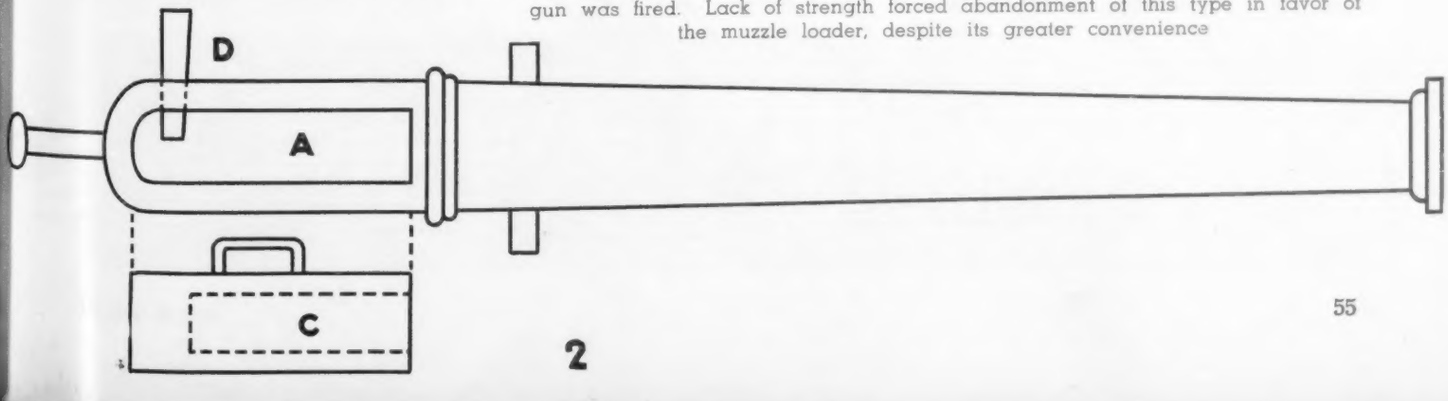
Distributing the Stresses: In these early examples of built-up guns no effort appears to have been made to take account of the variation of the hoop stress across the cross section of a thick cylinder. Since the tensile stress in the material composing a cylinder whose walls are too thick to assume uniformity of stress across the cross section (as in a boiler shell, for instance) varies inversely as the square of the distance from the center of the cylinder. Thus a tube strong enough to support a given internal pressure may be stressed to its elastic limit at the inner radius while carrying only a portion of the total possible load in its outer layers. Hence if we design the tube so as not to exceed the maximum permissible stress occurring at the inner radius, the gun will be much heavier than need be were some plan devised for spreading the total hoop load over all cylindrical elements uniformly. Conversely for a tube of given physical characteristics and dimensions the maximum permissible pressure will be governed by the induced stress within the steel where this is highest, namely at the inner radius.

Now there is nothing in this analysis that prevents applying its conclusions to the case of thick cylinders already stressed internally and preferably so application of the working load tends to distribute the total stress uniformly throughout the cross section. In cast guns, however, before the advent of the compound and wire wound types, efforts had been made to bring about this desirable condition by cooling the castings from the interior.

Progressive Solidification: This was done by passing a stream of water through a hollow core while the flask was surrounded by burning coals to prevent too rapid loss of heat from the exterior. Thus the inner portion of the casting solidified first and thereafter successive cylindrical elements in succession, each contributing to the state of final stress within the metal of the tube by its contraction upon the one within. Cast iron cannon made by this method were not only stronger but were less liable to enlargement of the bore after firing.

The advent of rifled cannon finally rendered the cast iron gun obsolete, but not before many unsuccessful attempts had been made to wrap coils of wrought iron around the barrels of cast guns originally of smooth bore, which had been returned to the shops so that grooves might be cut in them. The higher chamber pressures necessary for the successful performance of the rifled cannon, together with the increase in longitudinal stress resulting from the friction between the projectile and the bore due to the

Fig. 2—Some of the earliest cannon were loaded at the breech instead of the muzzle. Here A represents a rectangular opening for receiving the sliding element C which contained the charge. The Key D held the block in place while the gun was fired. Lack of strength forced abandonment of this type in favor of the muzzle loader, despite its greater convenience



2

use of lead or other sheathing envelopes, proved too much for cast metal. In the *London Times* of April 19, 1860 appears an account of some of these experiments. In one case a hooped gun bore its trials well until the thirty-sixth round, when it burst into fragments. Two other guns of 6½ inches bore, similarly hooped, were tested at Woolwich Arsenal, powder charges of 16 pounds and cylindrical shot weighing 160 pounds being used. At the sixty-second and sixty-third rounds respectively these two cannon gave way, the breech of each being driven off without any fragmentation.

Modern Methods of Distributing Stresses: Nowadays, to approach as nearly as may be practical to the ideal of a uniform distribution of tensile stress across the cross section of the gun in action, three courses are open to us. We may wind the tube with exceptionally strong steel wire, varying the tension during winding as may be required; we may construct the gun with several tubes or hoops, each shrunk upon the one within it; or we may subject a thick-walled gun tube to very great hydraulic pressure (90,000 to 120,000 pounds per square inch) and so produce a permanent set within the metal which progressively diminishes as we approach the outside of the tube.

This last mentioned method, originally developed just before 1914, is known as "auto-frettage," which being translated literally means "self-hooping." The winding of guns with wire has been completely abandoned in this country, partly on account of the lower rigidity of the barrel so built and its consequent greater tendency to droop and whip; and also because of some difficulty with relining. Then, too, the quality and reliability of large forgings for jackets and hoops has improved.

Design Steps: In naval practice the first step is the determination of the caliber of the gun (inside diameter of barrel) and thereafter the length. Next the powder pressure is settled, the number of chamber capacities selected and the effects of different powders calculated. Previous experience concerning the permissible densities of loading furnishes a guide to the proper weight of the powder charge and so at last, by combining these several variables in the most desirable way, the muzzle velocity and maximum pressure are obtained. From this point we proceed by way of an investigation of the shape of the powder pressure curve to the design of the several parts of the gun in order that the stress in the barrel will be nowhere greater than about 70 per cent of the elastic strength of the steel. This, it may be observed is a somewhat higher working stress than we would ordinarily adopt, but is used so that the weight of the gun may be kept within practical limits. Hence we observe the necessity for the greatest care in the selection and fabrication of its various parts which will be detailed in the second part of this article next week.

(*Concluded Next Week*)

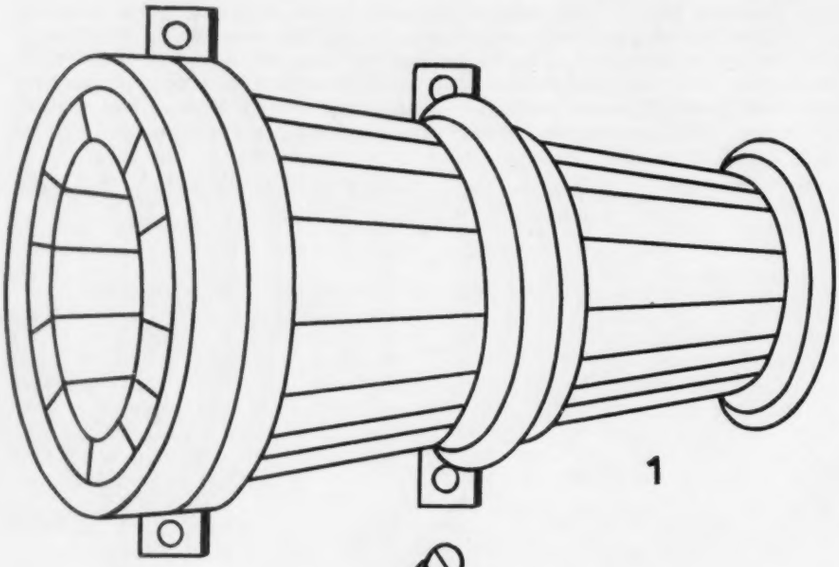


Fig. 1—An early form of bombard, constructed of iron bars bound together with hoops after the manner of the staves of a barrel

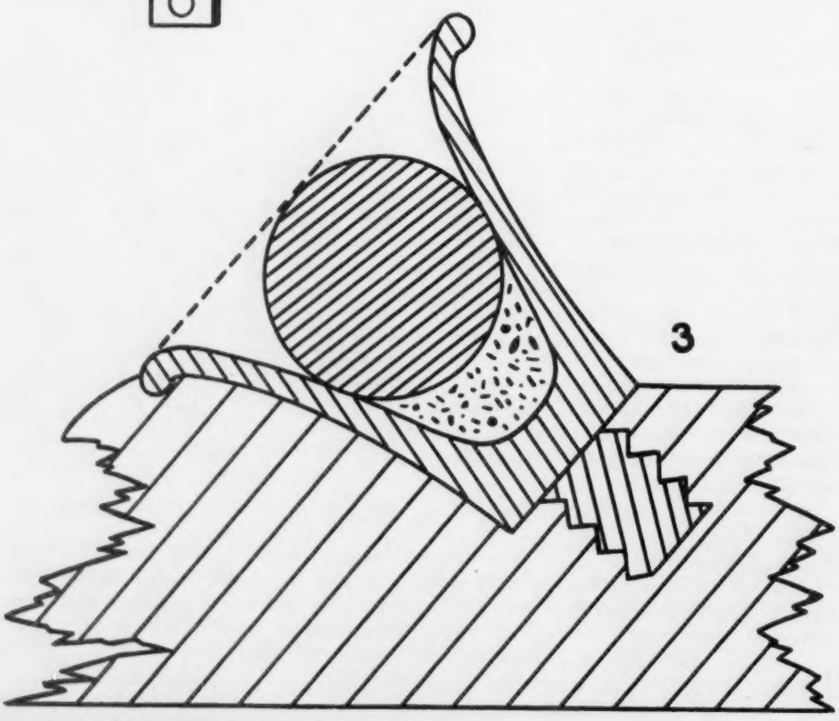


Fig. 3—The earliest cannon devised after the invention of gunpowder were conical, resembling an apothecary's mortar, hence the name. The stone projectiles which they fired moved relatively slowly and with little accuracy

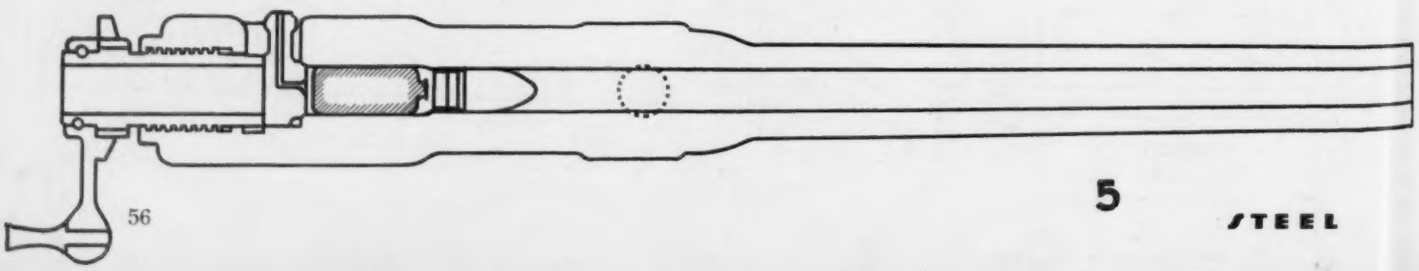


Fig. 5—Cross sections of the Armstrong gun showing projectile of modern form, breech closing arrangement and powder charge—all ready for action

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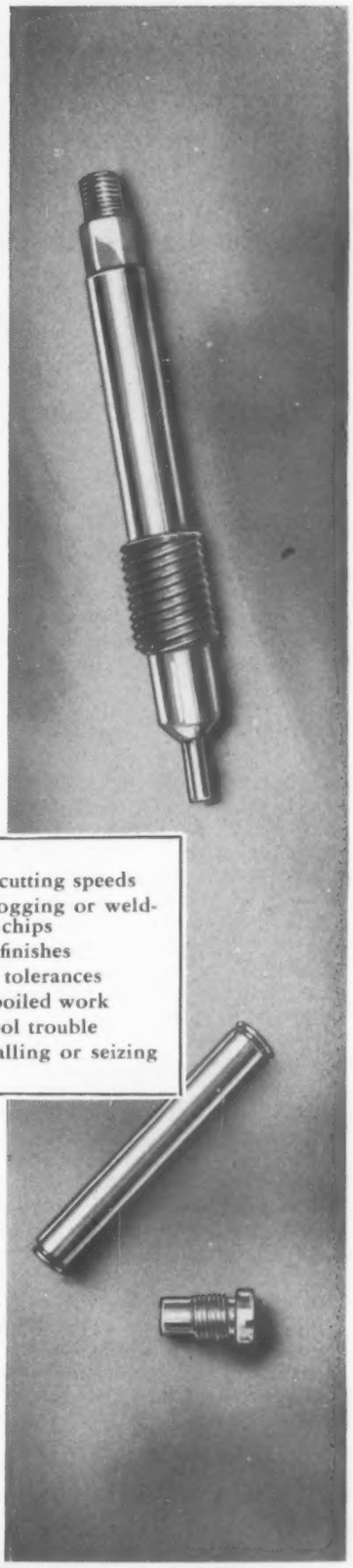

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Here's How

MOLYBDENUM-TUNGSTEN HIGH-SPEED STEEL

can be used to replace 18-4-1

With use of 18 per cent tungsten high-speed steels limited by OPM, every user should know of the satisfactory substitutes that have been developed. Here a metallurgist tells of his experience with an excellent substitute and how it can be adapted to your own needs

By **JOSEPH V. EMMONS**
Metallurgist
The Cleveland Twist Drill Co.
Cleveland

■ THE OFFICE of Production Management recently issued an order limiting the use of 18 per cent tungsten high-speed steels in order to conserve the supply and direct the distribution of tungsten. As we have had wide experience with the molybdenum-tungsten type of high speed steels, some of the information we have gained may be of interest to others.

This type of high-speed steel uses less than one-tenth as much tungsten as the well-known 18-4-1. It, therefore, fits particularly well into present plans for conservation of strategic and critical materials. Since it has now been in general commercial use for about eight years, many toolmakers besides ourselves have learned its superiority and made it their standard for high-speed tools.

Development of molybdenum-tungsten high-speed steel was based on many years of careful and costly research work. Recognizing its great economic and strategic value, every effort has been made to make it generally available to the public. Many steelmakers now produce it. While these steels are known under the general trade name of Mo-Max, each steelmaker has adopted a brand name of his own. See Table I.

From the original type designed to compete with 18-4-1, special purpose varieties have been developed to cover the entire field of 18 per cent tungsten specialty steels. Table II shows comparable types of 18-4-1 and molybdenum - tungsten high-speed steels.

Type 1 is the general purpose 18-4-1 type and the corresponding general purpose molybdenum-tungsten type. It should be noted that both classes of steel are being furnished in a wide variety of carbon contents for different purposes. The most common ranges of carbon are shown in Table III.

The low-carbon range is useful for dies, planer tools and other tools subject to shock. The intermediate range is suitable for tools such as drills, milling cutters and broaches. The high carbon range is adapted to reamers and lathe tools requiring great red hardness. This is the most common carbon range, and the one most commonly carried in warehouse stocks. It is expected that the hardness of properly hardened and tempered molybdenum-tungsten high-speed tools made from these carbon ranges will, in general, fall within the limits shown in Table IV.

Weight: In ordering steel it should be recalled that molybdenum-tungsten high-speed steel has about 8 per cent less weight per cubic inch than the 18 per cent tungsten steels. Thus, for a given purpose, 8 per cent less steel by weight need be ordered.

TABLE I—Trade Names of Molybdenum-Tungsten High-Speed Steels

Company	Brand Name
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.	"LMW"
Bethlehem Steel Co., Bethlehem, Pa.	"Bethlehem HM"
Braeburn Alloy Steel Corp., Braeburn, Pa.	"Mo-CUT"
Carpenter Steel Co., Reading, Pa.	"Star Max"
Columbia Tool Steel Co., Chicago Heights, Ill.	"Molite 8"
Crucible Steel Co. of America, New York	"Rex T-Mo"
Henry Disston & Sons Inc., Philadelphia, Pa.	"Di-Mol"
Halcomb Steel Co., Syracuse, N. Y.	"Rex T-Mo"
Jessop Steel Co., Washington, Pa.	"Mogul"
Latrobe Electric Steel Co., Latrobe, Pa.	"Tatmo"
Simonds Saw & Steel Co., Lockport, N. Y.	"S.T.M."
Universal - Cyclops Steel Corp., Bridgeville, Pa.	"Mo-Tung"
Vulcan Crucible Steel Co., Aliquippa, Pa.	"Vul-Mo"

Grinding Sparks: It will soon be discovered that the grinding sparks from molybdenum-tungsten high-speed steels are a bright orange color with a spear head on the end. Thus they are easily distinguished from 18 per cent tungsten steels with their dark red spark lines and from carbon steels with white lines ending in a star. It is thus easy to sort mixed steel and scrap by means of the spark test.

Fracture and Hardness: In starting to use molybdenum-tungsten high-speed steel, it is desirable to combine steel inspection with heat treatment practice on disks or test pieces before proceeding with expensive tools. The test pieces can be hardened and tempered under the conditions intended to be used on the tools to be made.

An inspection of the fracture, however, and a hardness test by any available means will indicate the response to the heat treatment and whether any adjustments in the conditions need to be made. The principal differences in behavior from the 18 per cent tungsten type are forging and hardening.

Forging is done at about 1900 to 1950 degrees Fahr. Note that this is lower than for 18-4-1. At this temperature it is quite plastic and forges with greater ease than the 18 per cent tungsten steels. Forging should stop when the temperature drops below 1700 degrees Fahr. Slow cooling after forging is desirable. Forging should always be followed by a full annealing.

Annealing is done in the same manner and at the same temperatures as 18-4-1. It is common practice to pack anneal at about 1550 degrees Fahr. The annealed hardness should be from 90 to 100 rockwell B.

Machinability of the type 1 molybdenum - tungsten high - speed steel is probably the best of all high-speed steels. It also grinds with ease.

Welding, Brazing: Mo-Max can be welded to carbon and alloy steel shanks or bodies when desired. The electric fusion method is per-

haps preferable for this purpose. When it is used, the welded pieces should be cooled slowly and should have a full anneal to refine and toughen the weld before hardening. For some tool applications, brazing may be preferable to welding. The brazing can be done at the same time as the hardening and only the usual tempering is then required for toughening.

Hardening of molybdenum-tungsten high-speed steels can be done successfully in many ways. Where there is a considerable volume of work, salt baths are popular. These are usually internally heated electric furnaces of which at least three types are available. Controlled atmosphere furnaces are made by several manufacturers and are preferred by some toolmakers. It should be noted that it is necessary to control the water vapor as well as the CO, CO_2 and O ratios.

For atmosphere furnaces where conditions are not the best, it is possible to use protective coatings of borax and copper paint on the tools to control carburization or decarburization. Such methods and precautions have for the most part been developed for the 18 per cent tungsten steels and are more or less necessary for all kinds of high-speed steels.

The hardening temperatures vary from 2150 to 2250 degrees Fahr. The lower temperatures of this range are used for the more delicate tools and where great toughness is desired. The higher temperatures of this range are used where the maximum red hardness is required—in lathe tools used under severe conditions for example. The higher temperatures are also used for very heavy tools. For general work, intermediate temperatures such as 2200 to 2220 degrees Fahr. are desirable.

Such variables as soaking times and quenching procedure are the same as for the 18 per cent tungsten steels. Straightening when required also is done by the usual methods. It is best done before the full secondary hardness is developed by tempering. It will be found that the lower hardening temperatures result in longer furnace life and less discomfort for the hardener.

Tempering or drawing should be done as soon as possible after the tools have cooled in the quench but not, however, until after the tools have cooled below 212 degrees Fahr.

Holding 30 to 60 minutes at 1050 degrees Fahr. produces a satisfactory secondary hardness. Some prefer two hours at 1025 degrees Fahr. while others prefer a double draw at 1025 degrees Fahr. When a high degree of toughness is desired, as for example in punches and dies, higher draws such as 1075 or 1100 degrees Fahr. may be used. Cooling from the draw should always be slow, for it is during cooling that the secondary hardening takes place, and this must not be hurried. Some typical hardness results after tempering steels of two different carbon contents are shown in Table V.

The problems involved in a shift to the molybdenum-tungsten type of high-speed steel are not difficult as the pioneering has been done. Commercial use has been slowly but firmly established so now it is estimated that in excess of 20 per cent of all of the high-speed steel used in this country is already of this type.

Rarely do we have a new product that is better, cheaper and more easily available than the old. Here is such a case. Numerous careful workers have reported that the performance of molybdenum-tungsten high-speed tools has averaged about 20 per cent better than tools made of 18-4-1.

Cost of the molybdenum-tungsten high-speed steel, taking into account both the lower weight per cubic inch and the lower base price, is only about 75 per cent of the cost of 18-4-1. The availability of molybdenum and tungsten in the amounts required is beyond question.

It is no more difficult to develop the right technique for molybdenum-tungsten steels than for other steels.

This has been proved beyond doubt by the fact that so many toolmakers, both large and small, already have changed over with results that have been entirely successful.

TABLE II—Comparable Types of 18-4-1 and Molybdenum-Tungsten High-Speed Steels

	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6	Type 7
	Molybdenum-Tungsten High-Speed Steels (Mo-Max)						
Carbon	0.80	1.00	0.40	0.80	0.85	0.88	0.88
Molybdenum	8.75	8.75	5.75	8.75	6.50	9.50	8.25
Tungsten	1.50	1.50	1.00	1.50	1.50	1.50	1.50
Chromium	3.75	3.75	3.50	3.75	3.75	3.75	3.75
Vanadium	1.00	2.00	0.75	1.00	2.00	1.00	2.00
Cobalt	....	....	....	5.00	5.00	8.00	8.00
	Comparable Types of High-Tungsten Steels						
Carbon	0.70	0.82	0.35	0.70	0.70	0.75	0.82
Tungsten	18.00	18.50	14.00	18.00	14.00	18.00	18.50
Molybdenum	....	0.70	....	....	....	....	0.70
Chromium	4.00	4.00	3.00	4.00	4.00	4.00	4.00
Vanadium	1.00	2.00	0.50	1.00	2.00	1.00	2.00
Cobalt	....	....	....	5.00	5.00	8.00	8.00

Note: From *Metal Progress*, April 1941, p. 430.

TABLE III—Carbon Ranges for High-Tungsten and Molybdenum-Tungsten High-Speed Steel, in Per Cent

	18-4-1 H.S. Steel	Mo-Max H.S. Steel
For tools of great toughness	0.54 to 0.60	0.64 to 0.70
For tools of moderate hardness and toughness	0.61 to 0.67	0.71 to 0.77
For tools of great hardness	0.68 to 0.74	0.78 to 0.84

TABLE IV—Hardness Ranges

Tough carbon range	60 to 64 Rockwell C
Moderate carbon range	62 to 66 Rockwell C
Hard carbon range	64 to 68 Rockwell C

TABLE V—Typical Hardness Values, Rockwell C

			Quenched from 2150°F.	Quenched from 2200°F.	Quenched from 2240°F.
		STEEL A—Analysis At Left			
Carbon	0.75	Not Drawn	66	65	65
Chromium	3.61	Drawn 940°F.	63	63	63
Molybdenum	8.66	Drawn 990	64	64	64
Tungsten	1.61	Drawn 1040	65	66	65.6
Vanadium	1.07	Drawn 1090	64	66	66
Manganese	0.14	Drawn 1140	63	64	65.5
Silicon	0.27	Drawn 1190	61	62	64
		STEEL B—Analysis At Left			
Carbon	0.80	Not Drawn	66	66	64
Chromium	3.65	Drawn 940°F.	63	63	63
Molybdenum	9.01	Drawn 990	64	65	64.5
Tungsten	1.35	Drawn 1040	65	66.5	67
Vanadium	1.23	Drawn 1090	64.6	66	67
Manganese	0.16	Drawn 1140	63	65	66
Silicon	0.29	Drawn 1190	62	63	65.5

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NP-86586-C SCHENECTADY, N. Y.
PRODUCTION DATA
This 50 lb. box of electrodes will produce 30.2 lb. of filler metal in joint, based on 2" stub ends.
Welding production is estimated as follows:
100 linear ft of 3/8" flat fillet welds
26.6 linear ft of 3/4" flat fillet welds
These electrodes will meet AWS specifications Class. E-6020 and E-6030.
MADE IN U. S. A.

Production data is available on heavily-coated, mild-steel electrodes, "all-position" types, W-20, -22, -25, -30 (⅛- to ¼-in. dia.) and "flat-position" types, W-23 and W-24 (¼-in. to ⅜-in. dia.). Data on other sizes on request.

EVERY INDUSTRY

G-E PRODUCTION-LABELED ELECTRODES
For Peak Production and Profit on Every Job

PRESSED by today's peak-production demands, management and operators are finding that the improved arcing and deposition characteristics of G-E electrodes save them time and money.

Speed, "usability," ease of slag removal, and low spatter-loss—all characteristics of G-E rods—are features that are causing both operators and management to decide in favor of G-E electrodes.

This "O.K." of G-E electrodes by users themselves is further strengthened by the full approval of every major board of authority having jurisdiction over welding codes and procedures. Each G-E electrode has authoritative approval for use on practically every intended application.

Even G-E electrode cartons save you both time and money!

On every 50-lb carton of mild-steel G-E electrodes you'll find production data — the estimated weld-footage obtainable on typical joints as well as the estimated weight of deposited metal obtainable. This production data enables you to estimate costs and production requirements more accurately than ever before. No more waste due to overages or shortages. No more guesswork in figuring pounds per foot or feet per pound—it's right on the label where it can't get lost!

Special Localized Electrode Service—Near You!

Your nearest G-E arc welding distributor or G-E office is part of a nation-wide organization set up to give you the kind of service that will help your welding profits. Just phone or write for a complete demonstration of G-E rods on your work. General Electric, Schenectady, New York.

GENERAL ELECTRIC

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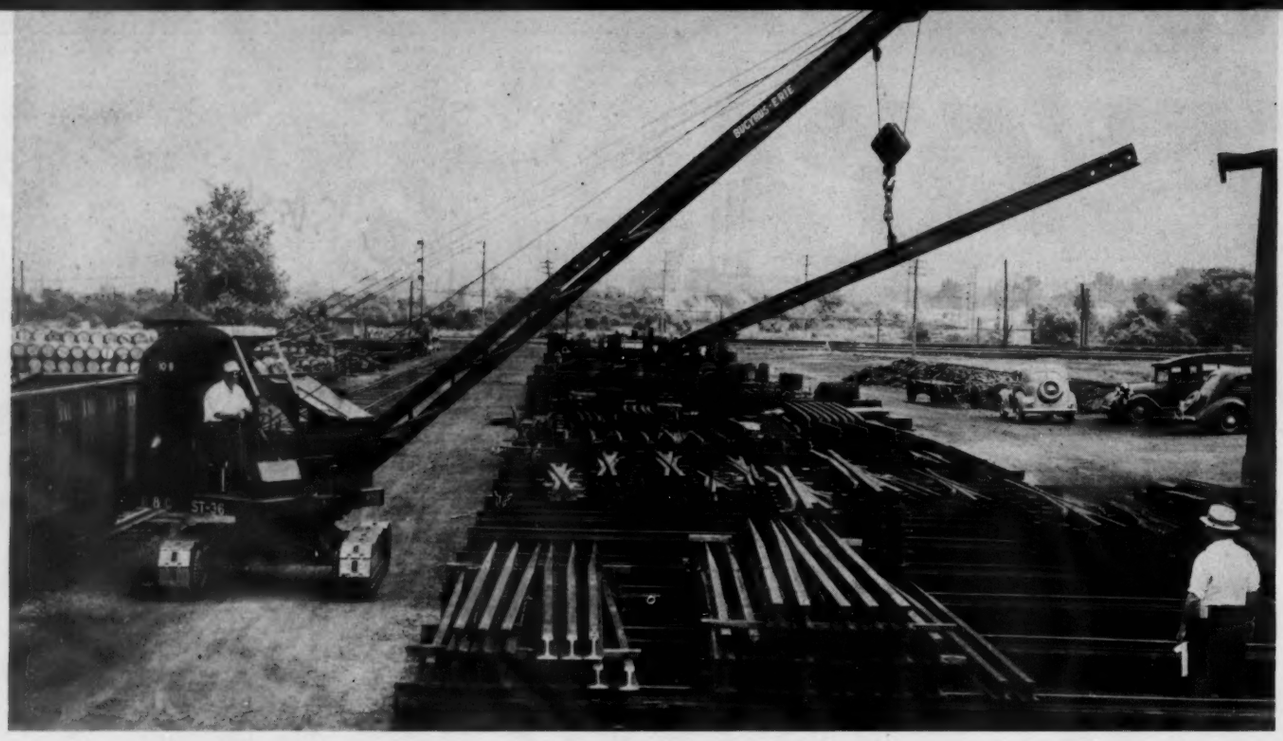

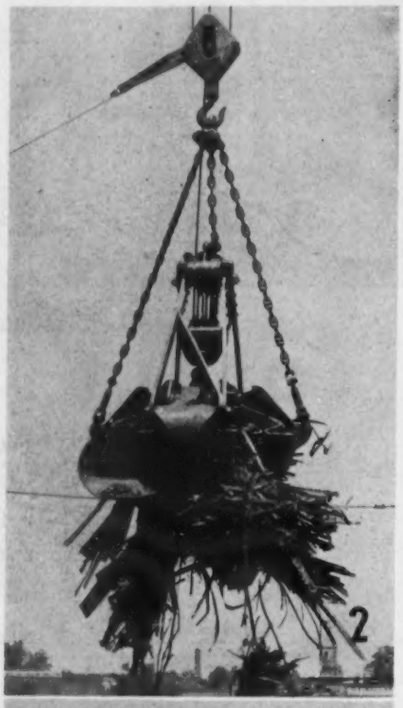

An Analysis of the

CRAWLER CRANE

as an industrial materials handling tool

■ THERE is one piece of materials handling equipment that appears to merit much more attention as an *industrial materials handling tool* than it gets—the crawler crane. To many plant men, it is still regarded only as a piece of contractor's equipment, one not having any particular application around an industrial plant. The truth is far from this, for, added to the extreme flexibility of the unit itself, the many pick-ups developed for use with the crawler crane make it one of today's most versatile materials handling aids.

For example, are you familiar with the following applications:

Grabs: Many types of tongs and grabs have been developed for specific handling problems such as moving structural steel sections as shown in Fig. 1. Here the Baltimore & Ohio railroad loads and unloads rails and track units with a tong-like device which eliminates necessity for elaborate slings in picking up these loads. It easily handles material up to 16 feet and longer, weighing 2800 pounds or more. Such a device speeds handling since it requires practically no time or effort to apply it. It is merely placed over the piece to be picked up, and as the lifting force is applied, the tongs clamp the work firmly.

Various other grabs have been developed for specific purposes. For instance, there is a strong efficient grab known as the rock grab and made in various sizes to handle large heavy bulky objects such as iron and steel ingots or billets, concrete blocks, rock, etc.

Another grapple is known as the pulp wood grapple, developed especially for handling uniformly piled material such as railroad ties, fence posts and the like. Of course it is equally applicable to handling rail sections and structurals of similar size.

Fig. 2 shows a typical special type of grapple used to handle nonuniform materials such as scrap iron, steel shavings, pressed scrap cubes and other bulk material, including nonferrous and nonmagnetic material which an electric magnet will not lift. In addition to this Owen grapple, there are various other designs of grabs and grapples for specific services.

Also the ordinary single-line clam-shell bucket is widely used for pickup work. Fig. 3 shows a regular 2-line clam shell — the type more efficient for hard digging and pickup—being used to handle a miscellaneous load of material.

Skip Handling. Crawler cranes often are used in the materials handling system of a plant for moving hand-loaded skips or containers filled with small scrap, castings or parts. These may or may not be loaded by hand, but often are carried through the plant by means of a monorail system, being handled outside of the plant by the crawler crane as shown in Fig. 4. Not only

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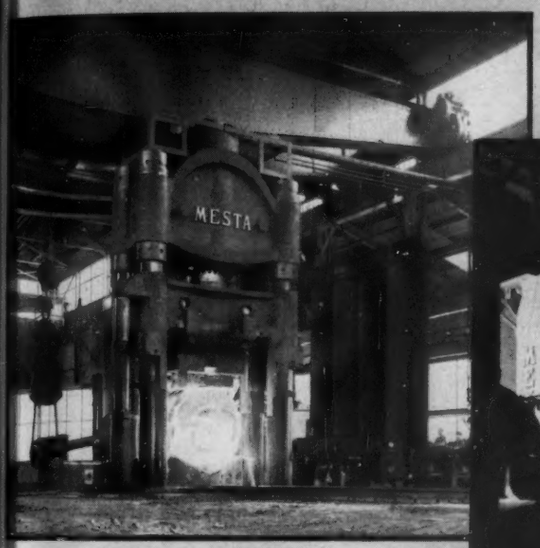
COMPLETE STEEL MILL EQUIPMENT

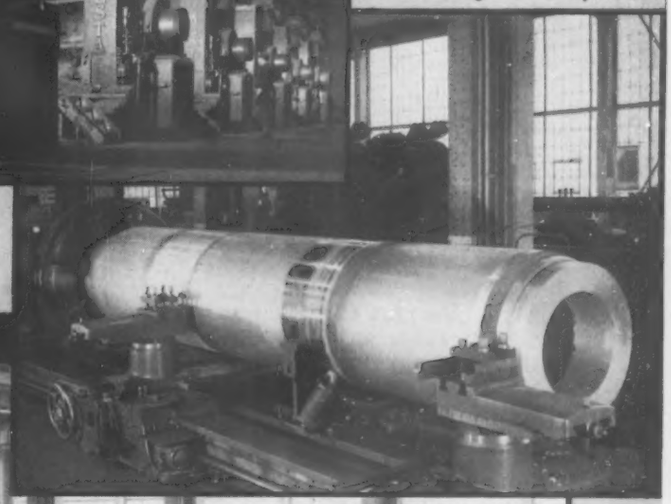
Heavy Duty Planer

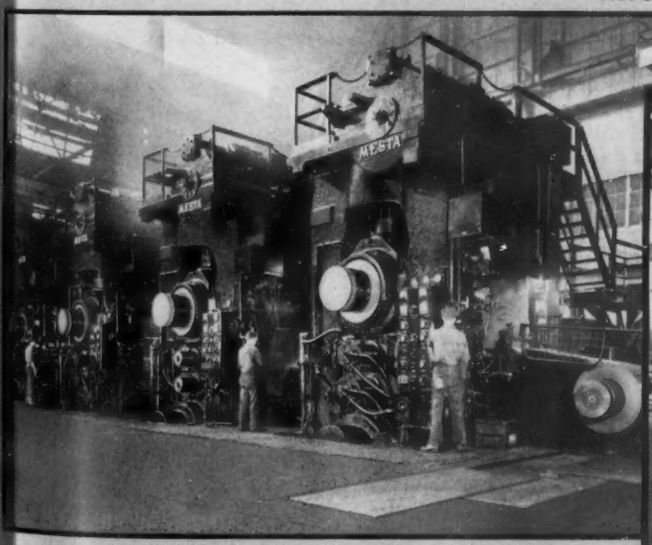


Forging 100" Ingot in
6,000 Ton MESTA Forging Press

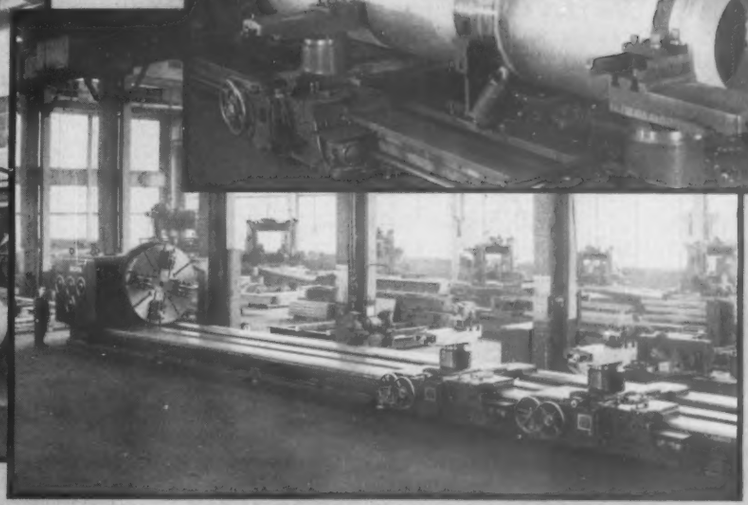
96" Four-High Ten Stand
Hot Strip Mill

Hollow Forged Steel Cylinder





54" Four-High Tandem Cold Mill for Thin Sheet Gauges



Heavy Duty Boring and Turning Lathe

MESTA MACHINE COMPANY • PITTSBURGH, PA.

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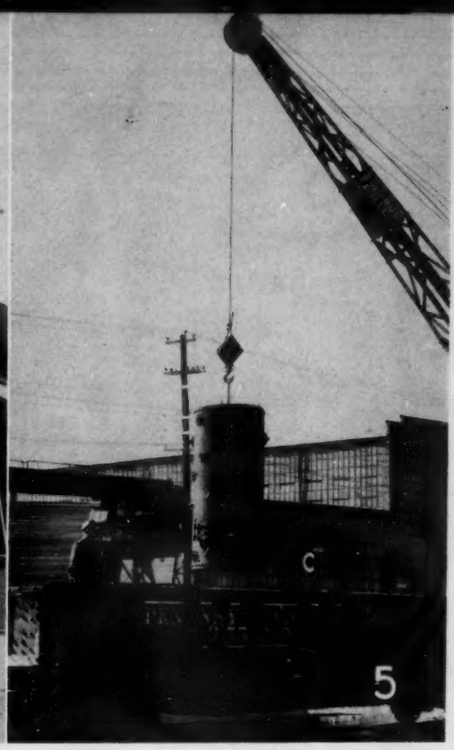

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does such a system fit well into the handling of work in process, but it also affords means of developing a system for regular and efficient disposal of waste.

Hook Lifts: Then, of course, many objects can be moved about by a hook engaging a lifting ring or some part of the object. Illustrated in Fig. 5 is a heavy boiler being loaded on a freight car in the Bucyrus-Erie yard at Erie, Pa., using a hook lift.

A variation of the hook lift is seen in Fig. 6 where the lifting pulley is connected to the load by means of a special fastening designed and built into the item itself. This insures proper handling of heavy, bulky or awkward shaped objects such as this large lock gate for the Fort supply dam.

Slings: Possibly the most versatile attachment of all is the sling since this unit can be made with various spreaders for loading anything from structural sections to trucks, tractors and airplanes. Fig. 7, for instance, shows a crawler crane lifting and stacking automotive frames at Chrysler Corp.'s Evansville, Ind., plant. The "gooseneck" attachment which can be fitted onto most crawler cranes is an aid in such work as this.

Of course the main advantage of the crawler crane is its extreme flexibility in being able to travel any place about the plant at a moment's notice. It is especially helpful in clearing up production bottlenecks. Suppose, for instance, there is a rush shipment that must be loaded today, but the track cranes and switch engine are urgently needed all morning over at the foundry, and taking the overhead crane away from the production gang on the erecting floor would tie up the entire works. The answer is to send in the crawler crane. It can pull in a flat or gondola car, load the shipment and go on about its business without getting in anyone's hair.

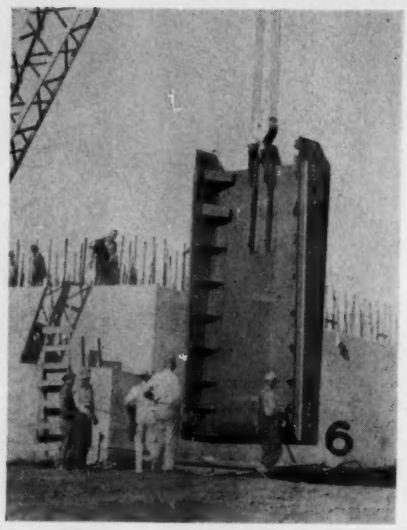
Often an attempt to increase production capacity and speed up output by adding more track cranes increases track congestion and delays the work of both old and new units—instead of helping the situation. Also, additional overhead cranes can only serve to increase handling capacity within the limits of track range.

A crawler crane, on the other hand, is free to help out anywhere along the line. It can be used to keep production going in event an existing track or overhead crane breaks down. Thus it affords an important reserve for emergency service.

Good Resale Value: Another point that is causing many manufacturers to consider the crawler crane more seriously for production work is that a crawler crane is not tied into the production line as a permanent unit. Because of this and because it has a ready rental and resale value, it is becoming regarded as a safe investment to meet temporarily increased production requirements.

For instance, it can be used to swing a concrete or metal skull-cracker to break up old concrete paving or structures, knock down walls, break up scrap castings and other demolition work. Too, the unit is convertible to a dragline, pile driver, pile puller, shovel or structural steel lift—all on a moment's notice. These additional uses provide assurance that a crawler crane, purchased for industrial materials handling, will never become simply another item of overhead expense.

Illustrations show Bucyrus-Erie equipment.



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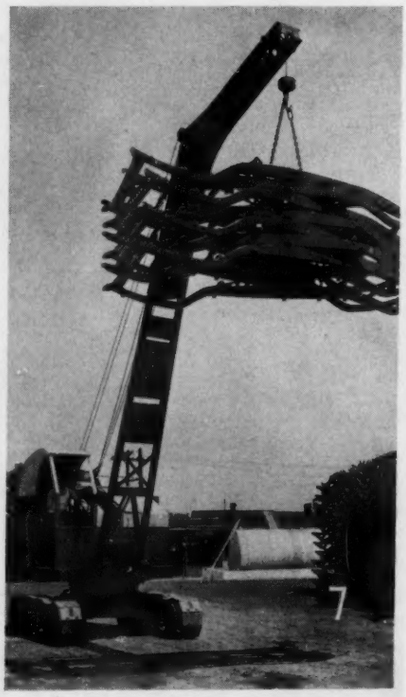

7

LAMSON BOLTS FOR *Steel* CONSTRUCTION

• Lamson & Sessions can meet your requirements in bolt and nut products for steel construction from warehouse stocks. In addition to machine bolts, fitting-up bolts, cotters, wire rope clips, nuts and other standard products in a full range of sizes, Lamson offers at least two specialties that dovetail with the present national emergency program of building soundly and economically, and in the shortest possible time. • Lamson Lock Nuts provide security where vibration is severe or where sustained or sudden shock is encountered. These nuts may be used over again and again. • Dardelet Rivet bolts produce steel joints more secure than riveted joints, and with greater speed and lower cost of assembly. No compressed air, forge or skilled labor is required with the use of Dardelet Rivet bolts—just a maul and a wrench is needed. • Structures in which these two products are used can easily be altered or dismantled. Particulars and samples on request.

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New Heat Treating Gas Prevents SURFACE DECARBURIZATION

■ DRYCOLENE, the new atmosphere gas for heat treating metals, first announced by General Electric Co. at the National Metal Exposition last fall, now is being used successfully by several industrial plants for heat treating their steel products without surface decarburization, according to the company.

The gas is one of the latest advancements in protective atmospheres for such operations as the scale-free hardening, bright annealing, sintering and electric-furnace brazing of high-carbon steels in which surface decarburization cannot be permitted. According to General Electric, the presence of carbon monoxide in drycolene opposes the decarburizing action of such impurities as carbon dioxide, water vapor or infiltered air, especially where large-size furnaces are concerned.

Steel Hardened to Surface

Steel hardened in drycolene has been found to be hard right to the surface and has passed such tests for traces of surface decarburization as the rockwell N ("Superficial") tests, weight change measurements and photomicrographs. For example, all three tests were made on SAE-52100 and 1090 steels. Samples were heated in drycolene for two hours at 1500 degrees Fahr. and quenched. Weight-change measurements showed slight increases in weight, indicating no decarburization. Rockwell hardness-comparison tests gave slightly higher converted "superficial" (N) values than the C readings, indicating no decarburization. And photomicrographs showed absolute uniformity of structure extending to the very surfaces.

The drycolene producer, now being made in sizes of 200 and 750 cubic feet per hour, is a gas-fired reaction chamber with a number of accessories—all mounted as one unit. Several refractory-screen type burners project through the side wall of the chamber. Charcoal is stored in a hopper at the top of the chamber which in turn feeds the material down through a vertical retort. The hopper is provided with both a cover and fittings for optional manual or vacuum charging.

The producer itself consumes hydrocarbon gases such as coke-oven, natural, propane or butane gas. The hydrocarbon gas and air first pass through visual flow meters to show the input volume of each. They then enter a gas-combustion controller, consisting of a mixer which automatically holds the proportion of gas and air constant under all conditions, a compressor and a pressure regulator.

From the gas-combustion controller, the mixture goes through a self-closing fire check to the burners in the unit itself, heating the charcoal in the retort to incandescence. Products of combustion travel through an externally mounted surface cooler, where most of the moisture is removed. An activated-alumina dryer may be inserted at this point if all the moisture must be removed to reduce the hydrogen content of the drycolene to the lowest point practical.

From here, the gas travels through the incandescent charcoal where further reactions take place and drycolene is formed. Any carbon dioxide or water vapor present is here converted into carbon monoxide and hydrogen. The gas after passing through a dropout chamber leaves through a filter which removes charcoal dust. It then passes through a visual flow meter which indicates the usable output rate.

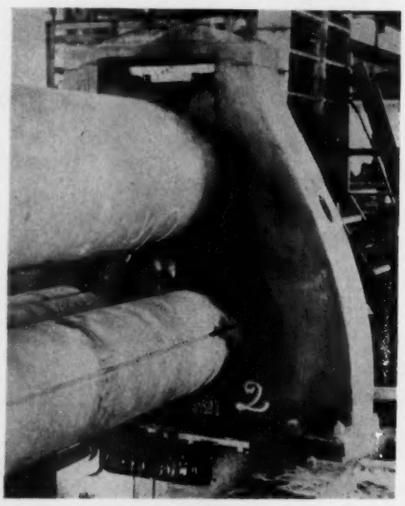
Based on operating costs of a 750-cubic-foot-per-hour drycolene producer operating at full capacity, the accompanying table shows the cost of producing the gas. Estimates include 4 pounds of charcoal (at 2 cents per pound) per thousand feet of drycolene.

TABLE I—Cost of Producing Drycolene

Per 1000 Cubic Feet From Various Fuel Gases

Coke-oven gas @ 60 cents per thousand	29 cents
Natural gas @ 40 cents per thousand	16 cents
Propane gas @ 8 cents per gallon from tank car	24 cents
Propane gas @ 25 cents per gallon from cylinders	57 cents

"Cheating" Time



■ When the casting supporting the lifting mechanism and 40-ton top roller on a huge 30-foot plate roller broke at the Ingalls Shipyard in Pascagoula, Miss., the use of arc welding saved the yard, busy with defense work, from a several months shutdown. The new casting shown was constructed in 5 days from 1¼-inch steel plate. Photo by Hobart Bros. Co., Troy, O.

Issues Tube Data Chart for Engineers

■ In an effort to relieve engineers working under the high pressure of defense production, Steel & Tubes Division, Republic Steel Corp., 224 East 131st street, Cleveland, is offering a new tube data chart which makes available in abbreviated form a useful compilation of electric resistance welded tube data on sizes, tolerances, weights per foot, chemical analyses and physical properties of round tubing and also squares and rectangles.

Compact enough (22 x 14 inches) to be hung on the wall or placed under the glass top of a desk, the chart is entitled "Engineering Data on Electric Resistance Welded Steel." Copies are available upon request.

Develop Penetrating Paint for Metals

■ A new finish with unusual penetrative and protective qualities called light gray Totrust is announced by Wilbur & Williams Co., Park Square building, Boston.

Possessing the same qualities as aluminum paint in regard to color, light reflection, etc., it can be used either indoors or out. In addition, it stops rust at its source, covering pinholes and rusted pits in metal, expelling any moisture which may be present—surrounding and isolating particles of rust—forming a hard, durable, flexible film. One gallon of this finish covers approximately 800 to 1200 square feet.

Limestone being added to an open-hearth furnace. Charging graphite between raw limestone on the hearth and burned lime as a covering provides an open heat and helps the graphite to enter the solution

Use of AMORPHOUS GRAPHITE In the Open-Hearth Shop

Shortage of pig iron has forced many steelmakers to swing over their open-hearth shops from cold metal charges to all steel scrap heats. The changeover has been effected by the use of graphite which is one of the most efficient and economical sources of carbon for making high-quality steel. The method of adding this material is explained in the accompanying article

By R. J. ZEMANEK
Metallurgist
United States Graphite Co.
Saginaw, Mich.

■ BECAUSE of the sharp increase in iron and steel production for emergency purposes, steel mills are faced with a possible shortage of pig iron due to its limited output, particularly in certain localities where the open hearths do not have a supply of hot metal from the blast furnace and must charge cold pig iron. Several open hearths are already experiencing the tightness of pig iron supply and are experimenting to find new materials which will enable them to make good steel from 100 per cent scrap charges.

The principal problem is to supplant the carbon normally charged when the pig iron is added and provide a source of carbon which is equally dependable. The most logical material to provide the carbon necessary is the mineral graphite, naturally suggesting itself to replace the graphitic carbon occurring in pig iron.

Mexican graphite No. 348 represents the most dense and lowest volatile carbonaceous material available and one that is free from phosphorus and sulphur which is usually present in abundance in nongraphitic carbons. Its great density allows it to occupy a minimum of space in the charge, and its lack of pore structure and natural high refractoriness gives the necessary resistance to oxidation. This type graphite is inert to acid or basic reactions and is readily absorbed by molten steel. It is especially sized to exclude all dust and a special particle range is maintained to keep oxidation losses to a minimum, provide a dense pack, and supply a particle readily dissolved by the metal.

The inherent characteristics of the Mexican product provide an efficiency of over 70 per cent in carbon recovery in both acid and basic open-hearth practice while sulphur and phosphorus are held to a minimum. The fact that sulphur and phosphorus cannot be removed in acid practice makes this material doubly desirable, and it is being successfully used to economically produce all grades of steels ranging from low carbon to carbon steels over 2.00 per cent carbon. Efficiency of carbon recovery is maintained over 70 per cent in every instance with all scrap charges, and one operator reports that in their acid open hearth 100 per cent carbon recovery is obtained melting 1.50 carbon steel and that this pound-for-pound recovery is dependable and consistent.

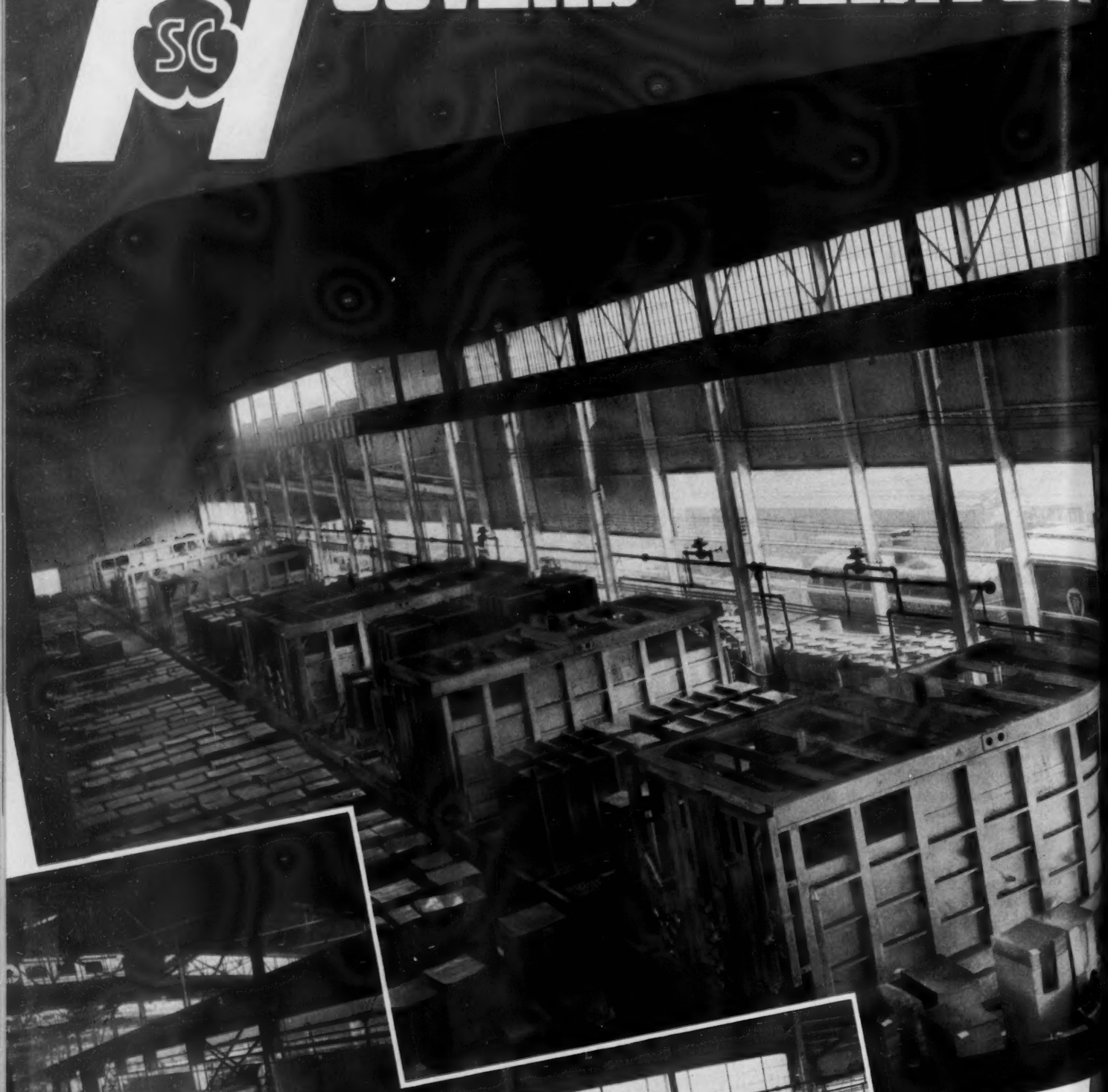
How Material Is Used

In acid open-hearth practice the furnace bottom may be covered with a light layer of scrap before charging the graphite or it may be charged directly onto the furnace bottom with no harmful effects. A recommended procedure for charging is to fill the charging box a third full with borings and then place over this a few 100-pound bags of the No. 348 Mexican graphite, finally leveling off the box with more borings. When the box is overturned onto the furnace bottom, instant coverage will be obtained and a maximum carbon recovery assured. Enough boxes are charged in this manner to give the calculated amount of the graphite, and then several boxes of additional borings or light scrap are charged to provide complete coverage. For further protection of carbon a covering of 10 per cent ferrosilicon may be charged immediately following the carbon charge. Sufficient silicon may be added to equal that of the pig iron being replaced. The quality of steel made is said to be the equal of that produced with pig iron.

Another method successfully employed in acid open-hearth practice is to charge the Mexican graphite in steel drums holding 500 pounds. The drums may then be covered with the proper amount of 10 per cent ferrosilicon before charging the scrap. No manganese is necessary in either instance, but this may be added to the furnace prior to tapping or to the spout when the heat is being tapped.

Standard formulae are used to calculate the amount of No. 348 Mexican graphite necessary, bas-

77 SC COVERS FOR WEIRTON



Above: A portion of the 16 Surface Combustion radiant tube annealing covers, installed in the 48" strip mill at Weirton, W. Va., used for both sheets and coils.

Above: Six of 12 SC covers at the Steubenville tin mill.

Left: Double row cover at Steubenville tin mill. Center bank of radiant tubes permits the heating of a large tonnage under one cover.

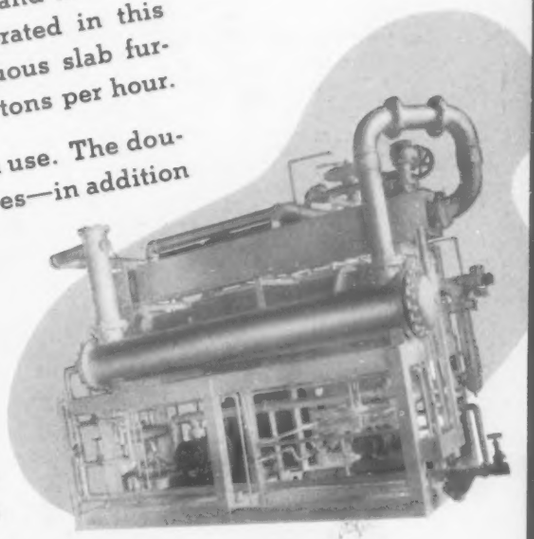
TO THEIR PRESENT 58 (SC) RADIANT TUBE ANNEALING COVERS FOR STRIP, SHEET, AND TIN, WEIRTON STEEL COMPANY NOW ADD 19 MORE...WHICH AGAIN FULFILLS THEIR EXACTING DEMANDS AND STANDARDS OF "DOUBLE CONTROL" OF QUALITY IN FINE STEELS

★ **ALWAYS AMONG THE FIRST** to take advantage of the latest and most modern equipment developed by and for the steel industry, the Weirton Steel Company purchased from Surface Combustion one of the first radiant tube annealing covers in 1934. Today, there are 58 SC radiant tube annealing covers operating in the Weirton strip, sheet and tin mills ...19 more are now being built. Also incorporated in this latest production project are three SC continuous slab furnaces, each with a rated capacity of 80 gross tons per hour.

Both single row and double row covers are in use. The double row covers with a center bank of radiant tubes—in addition to the two customary banks arranged along the side walls—permit rapid and uniform heating of exceptionally large tonnage under one cover. Surface Combustion DX units supply the protective atmosphere.

When considering your next installation of radiant tube annealing covers, ask SC to show you performance records of the latest type annealing covers. You may be pleasantly surprised at the rapid heating rate, uniformity of anneal, and low fuel consumption resulting from new developments.

SURFACE COMBUSTION CORPORATION · Toledo, Ohio



The above DX unit, recently installed at the sheet mill in Weirton has a rated capacity of 10,000 cubic feet per hour of atmosphere gas. Recent improvements in the construction of these units have made possible further control (where necessary) over the usual small traces of oxygen or air—also of water vapor.

WHEREVER HEAT IS USED IN INDUSTRY

SURFACE (SC) COMBUSTION

33 YEARS

MANUFACTURERS OF INDUSTRIAL FURNACES · JANITROL GAS-FIRED SPACE HEATING EQUIPMENT · KATHABAR AIR CONDITIONING SYSTEMS

ing recovery on 75 per cent efficiency. About 30 points additional carbon is calculated over the clear carbon desired in steels of over 0.75 carbon content to provide a safety factor and take care of oxidation losses. This factor may be reduced to 10 points when working soft steels.

Basic open-hearth practice requires that the graphite be covered over with the lime to obtain best results. In this way the carbon is not released until the steel is melted and the lime comes up. The graphite may be charged onto the furnace bottom after it has been covered with a layer of scrap and then the lime charged over it. By placing the graphite on top of the lime boxes or within them, rapid and complete coverage is assured. More lime is available to remove sulphur and phosphorus inasmuch as the silicon ordinarily charged with pig iron is not present and the quantity of lime necessary may be reduced if the sulphur in the scrap offers no difficulty.

It has been suggested that a quantity of raw limestone be charged together with the graphite or that the graphite be sandwiched between raw limestone on the furnace bottom and a burned lime covering.

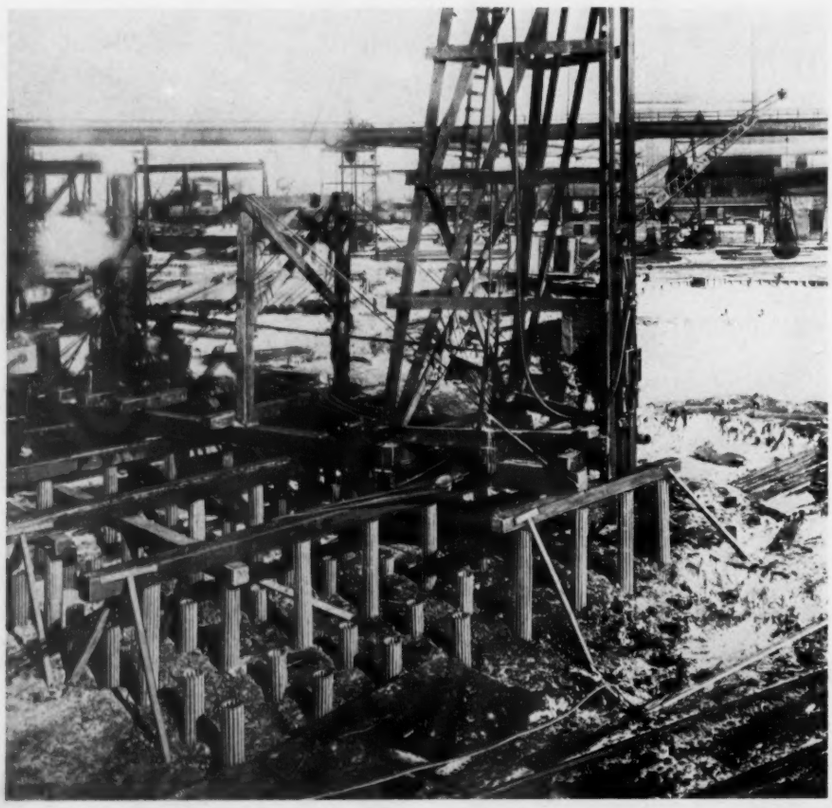
This particular action would provide a more open heat, besides helping to bring sulphur out of the melt and into the slag more effectively, will aid the graphite to enter solution.

This method was discussed at the recent spring meeting of the Pittsburgh Open-Hearth Committee sponsored by National Open-Hearth Committee of A.I.M.E., and most operators agreed that this would be good practice.

In a number of open hearths it has now become regular practice to charge all steel scrap and graphite, and it appears that equally good results may be obtained in basic practice.

This material thus far represents the most efficient and economical source of carbon obtainable to produce a steel of the very highest quality.

Steel Foundation for Blast Furnace



■ When preparing this 900-ton capacity blast furnace foundation, several thousand dollars in construction costs were saved by using steel piles instead of the usual wood cribbing underneath the pile drivers. The pile casings, furnished by Union Metal Mfg. Co., Canton, O., were driven 85 feet in one piece. Short extensions were then tack-welded intermittently to the tops of the piles and cap timbers laid across these extensions. The rigidity of the Monotube piles eliminated necessity for cross bracing

Completes Work on Standard Abbreviations

■ American Standards Association reports completion of the revision of standard abbreviations for scientific and engineering terms. It includes such common terms as pounds per square inch, dollar, and dozen, as well as kilograms per second, reactive volt-ampere and British thermal unit.

The standard has been developed by a group of engineers, editors, and scientists representing many national organizations. Leadership for the work has been taken by the American Association for the Advancement of Science, the American Institute of Electrical Engineers, the American Society of Civil Engineers, the American Society of Mechanical Engineers and the Society for the Promotion of Engineering Education.

Chief difference from the earlier edition is the inclusion of abbreviations for terms not previously covered, and the shortening of certain previously recommended abbreviations.

Other characteristics of the standard are:

The elimination of spaces between word combinations or letters; and elimination of periods except in cases where the abbreviation spells out a common English word.

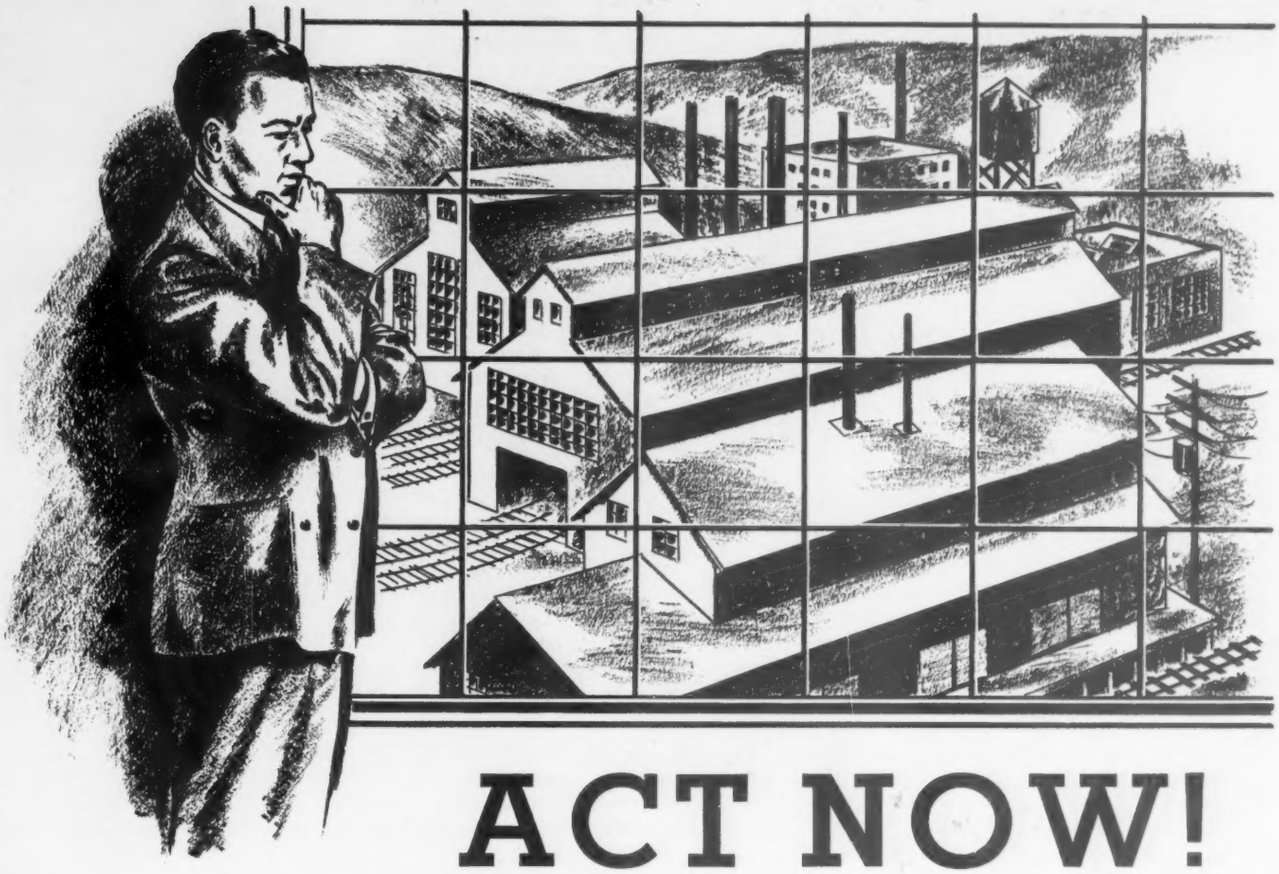
This standard—"Abbreviations for Scientific and Engineering Terms" (Z10.1-1941)—is now available in pamphlet form and may be obtained for 35 cents from association headquarters by addressing a request to 29 West Thirty-ninth street, New York.

A Substitute for Zinc To Protect Steel

■ A timely answer to the problem of licking corrosion without zinc-coated metal is given by Roxalin Flexible Lacquer Co., Elizabeth, N. J., who calls attention to Roxaprene, a corrosion resistant speed synthetic that compares most favorably with other protective coatings for steel.

Because the product can be applied by dip, spray or roller coat, it requires no special equipment whatsoever.

Also, it air dries quickly or may be force dried in half the time required by conventional synthetics. This production facility eliminates much of the extra time, handling and processing formerly involved in protecting steel. The material is already being used successfully by manufacturers of air conditioning equipment, motor trucks, bottle caps, fans, blowers, pumps and special machinery.



ACT NOW!

Don't Dissipate Assets in a Losing Fight Against Idle Works Expense

If your business can not be geared to the "all-out" defense program and must close from lack of material, you should make your decision now to liquidate while conditions are more favorable than ever before for such action.

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AN IMPORTANT METHOD.....

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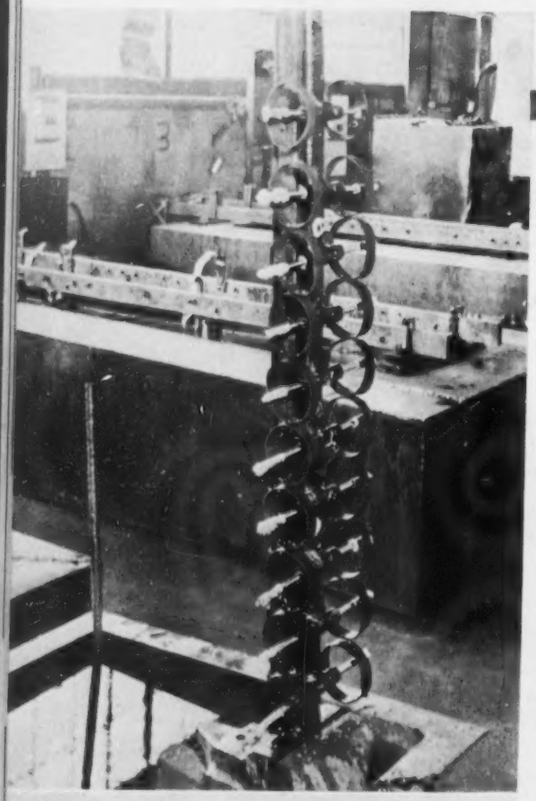
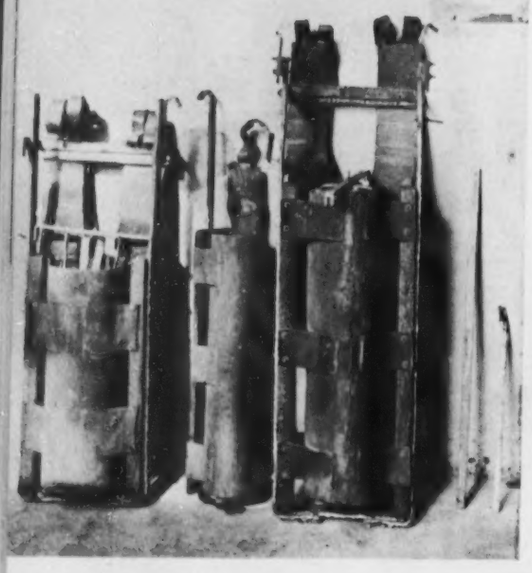
To Extend Life of Tools and Dies
To Salvage Worn and Undersized Parts
To Maintain Dimensional Accuracy of Gages





Extreme hardness, low coefficient of friction and other desirable characteristics open up new fields for chromium plating, in addition to ornamentation. Here Mr. Hyduke, in charge of a shop devoted almost entirely to industrial applications, details the advantages of chromium plating for this work, some of the factors involved, approved procedure and equipment employed. A new plant, with several unusual features and designed especially for this work, is described

By JOHN T. HYDUKE
General Manager
Durable Plating Co.
Cleveland

■ SINCE the introduction of chromium plating some 15 years ago, it has been very widely adopted as a means of imparting a highly durable finish on many parts—especially in the automotive industry. Today, however, one of its most important applications is on work on which it is desired to utilize the extreme hardness of the chromium deposit to resist wear. Such a coating is useful not only as a means of obtaining a highly permanent surface of pleasing appearance but as a means of adding metal to worn surfaces or those made undersize inadvertently during manufacturing also as a method of protecting against wear in service.

The hardnesses possible range all the way up to 625 Vickers-Brinell, 8 Mohs, and 2 microns scratch width on the Bierbaum Microcharacter test. Plating conditions, however, greatly affect the hardness of the deposit. Most chromium plate will be found file hard. Wear resistance usually is far superior to that of fully hardened tool or die steels.

Fig. 1—A typical rack, top view, with special shaped lead anodes. It holds 20 small cylindrical parts, each 2 inches long and ¼-inch in diameter

Fig. 2—Other special racks with lead anodes for plating cylindrical parts. See lower view

The deposit has other characteristics that should be noted. For instance, it is quite brittle, so should not be used on surfaces subjected to shock loads. Heating to temperatures between 300 and 400 degrees Fahr., however, improves the toughness without lowering wear resistance. Chromium plate has a low coefficient of friction, is nonwetting. Used on forming molds, it will prevent sticking of resinous plastics, rubber, paper and celluloid and will produce a better appearing surface on the molded product as well as reducing mold wear.

Before the advent of chromium plating undersize parts, such work could be reclaimed only at considerable expense, and many parts were simply discarded and crossed off as a complete loss. Today, however, the practice of building up undersize and worn parts by chromium plating is quite common. As a "putting on" method, it has few equals. Too, many parts such as gages and fixtures which are subject to considerable wear can be chromium plated during manufacture as a means of guarding against loss of

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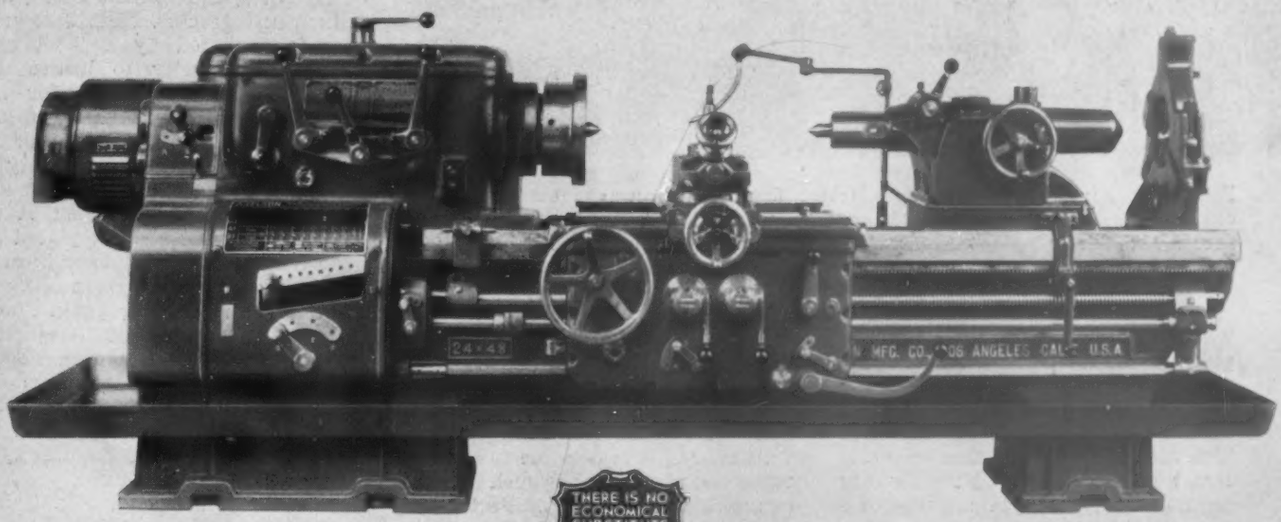

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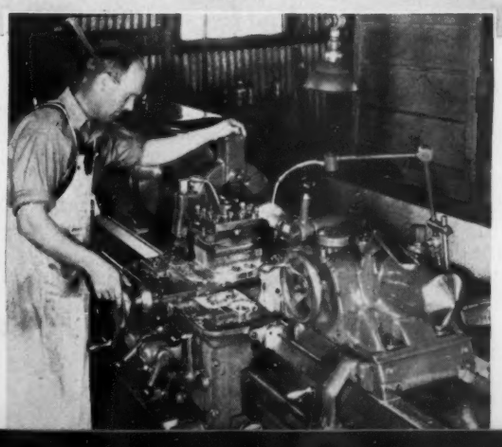

At the left an Axelson Lathe is shown turning a half-inch taper on the end of a piston rod. This job requires accuracy to .001 of an inch.

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dimension in hard service.

A chromium plate only 0.0015 to 0.0020-inch thick after grinding to size has been noted to extend the life of cylindrical plug gages 400 per cent and more compared with that obtained using the best grade of hardened tool steel unplated. In addition, many tools operate easier when chromium plated. Milling cutters, reamers, taps, drills and metal cutting saws show longer life and better operation on many materials including steel, cast iron, copper and aluminum. Similarly, drawing dies and mandrels give three to five times usual life if chromium plated.

Chromium plating differs radically from ordinary plating in one important aspect. In ordinary plating, an electric current flows from the anode to the cathode, taking metal with it from the anode to the work, which is the cathode. In chromium plating, the anode is lead, and current flowing from the anode to the work or cathode obtains chromium entirely from the plating solution. This means, of course, that the solution must be controlled rigidly and kept at the correct pH and temperature at all times.

Equally important, it means that if a uniformly thick coating is to be deposited, the current distribution to the work—that is, the current density per unit of area—must be likewise uniform. To meet this requirement, many special lead anodes are used to afford paths of equal length from work surfaces to nearest anode surface. Typical anodes of special shape used in this plant will be described.

Practice at the Durable Plating Co., Cleveland, in handling such work has been highly developed—an entirely new plant being erected recently with facilities designed especially to handle this work in the most efficient manner.

Since chromium plating will not deposit on a dirty or greasy surface, the first step in handling work is to clean it. All the salvage work done in this plant is on steel, a metal which cleans readily. While the majority of parts received from the customers are practically clean, usual practice here is to employ a grease solvent such as gasoline to put them in a perfectly clean condition. Many cylindrical parts are prepared by mounting them in a lathe and polishing them with 200-grit manufactured alumina cloth. This treatment effectively removes both grease and dirt. Of course it is most essential that the cleaned surface thus made must not be touched with the hand after polishing as even the small amount of oil on one's skin will result in a poor plating job.

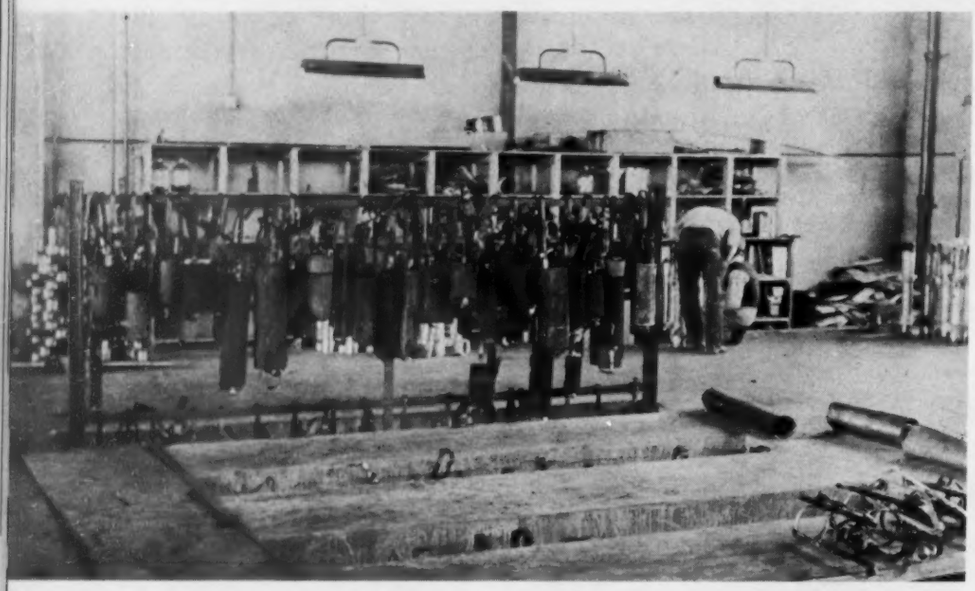

Fig. 3—Facilities in the new plant include this special arrangement for storage of the plating racks. They are hung on a frame and lowered into pits below floor level, thus being protected and also out of the way. Covers over the pits permit the floor space to be utilized

Of course, it is possible to employ other cleaning methods such as various pickling processes. Electrolytic acid pickling is the only way to remove heavy scale in deeply recessed parts. Sandblasting also may prove advantageous, especially where a high strength bond must be produced between the plate and the bare metal.

The next step is equally important. In practically all salvage work it is desired to deposit chromium plating on only a portion of the surface. To prevent the deposit from being formed on the remaining sections, they are covered or "stopped off" in a number of ways. One of the most satisfactory is the use of a red lacquer, specially compounded for this purpose. Other means include wrapping parts of the work with electrician's tape or covering with tin or sheet lead.

Next operation prior to plating itself is to assemble the work on racks. In the interests of getting as much work as possible into the tank to make most efficient utilization of the plating facilities, it is advisable to assemble the work on racks, especially small parts. This permits a large volume of work to be handled in a relatively short time, and yet each part can receive a processing period sufficiently long to give it the coating thickness desired.

Thick Deposits Require Time

Thickness of ordinary chromium plating in most salvage work runs anywhere from a few thousandths of an inch to 0.070-inch, or even more. The thickness obtainable is merely a question of time in the bath. Under ordinary conditions, the thickness of a chromium deposit can be built up at a rate of 0.002-inch on diameter per hour. Thus if a coating 0.020-inch thick is desired, the parts must remain in the bath for 10 hours. Thicker deposits require a proportionately longer time. Thus racking a large volume of parts into the plating bath at one time is most essential for economical processing.

Fig. 1 is a typical rack. It is designed to hold 20 small steel cylindrical parts, each 2 inches long and ¼-inch in diameter. Note that each part is encircled by a sheet lead anode—a necessity to insure uniform current distribution for uniform plate thickness, as was previously mentioned. Anodes and cathodes are insulated adequately as they are mounted on a wood support. The projections seen at the ends of the pieces to be plated are lead plugs which have been inserted to prevent chromium from being deposited in holes in the work. The irregular appearance of these plugs is caused by a chromium deposit which has been built up, resembling miniature stalagmites. This illustration affords a general idea of the type of racks used for small cylindrical parts in this plant.

The unit at left in Fig. 2 is a special rack for plating external surface of a cylindrical piece 18 inches long and 4 inches in diameter. The work is suspended inside the sheet-lead anode, which in turn is fastened to two wood supports. The part in the center of Fig. 2 is a special lead anode, while at the right is another rack for externally plating a cylindrical part that is 24 inches long and 4 inches in diameter. The work is centered inside the lead anode here also.

To assure uniform distribution of

current to the work, it is necessary to utilize a large number of such racks designed for the various types of parts handled. While a given rack often can be used for several jobs or modified slightly to fit additional jobs, these racks accumulate rapidly so it is necessary to provide special storage space for them in the plant. In the old plant this was a serious problem. In laying out the new plant, special attention was given to rack storage to prevent this from becoming a nuisance.

Fig. 3 shows the method employed here. A number of racks are hung on a special supporting frame. When not in use, this frame is lowered into one of six concrete pits provided here especially for the purpose, using an electric hoist running on an overhead trolley as the method of placing the frame. Once the frame is deposited in a pit, the recess is covered, permitting utilization of the floor area for other work. Six pits are provided in a row as shown in Fig. 3. This provides facilities for storing a large number of racks where they will not accumulate dust nor interfere with other operations. At the same time, they are instantly available when needed.

Hoists Handle Large Work

The plating tanks, three in number, are each 8 feet long, 30 inches wide and 4 feet deep. One tank has a deep extension which makes a total depth of 18 feet available for handling special work. This permits objects which otherwise would be too long to fit into the tank to be handled easily. Fig. 4 shows two of these tanks in the new plant with electrical controls conveniently placed on the walls nearby. The tanks are steel, lined with special acid resisting brick.

Small work is handled in and out of the tanks by hand while hoists are provided for large work. For most salvaging work, the voltage used for chromium plating is 5 volts. The current may run as high as 15,000 amperes if all three of the tanks are loaded.

Considerable volumes of hydrogen and oxygen liberated in plating carry much spray with them. As this chromic acid spray irritates mucous membrane of nose and throat, thus forming an industrial hazard, special provision has been made to prevent any fumes from escaping into the room. A special exhaust system is installed with ducts round the entire periphery of the top of each tank. Thus air from the plant is drawn across the top of each tank and exhausted, carrying with it the fumes from the solution.

Typical work handled here includes worn automotive engine crankshafts which have the bearing surfaces built up by chromium plating. In plating these bearing surfaces, it would appear necessary at first thought to protect all of the shaft except that portion to be plated. However, this is not so as a piece of sheet tin or lead placed over the webs at each side of the bearing and top surface then painted will block off the flow of current to those areas and confine the deposit to the bearing surface itself. In such work, the cylindrical sheet lead anode employed is only as wide as the bearing to be plated. This same method of blocking off the flow of current to parts on which deposit is not wanted is employed on much other work also in addition to crankshafts.

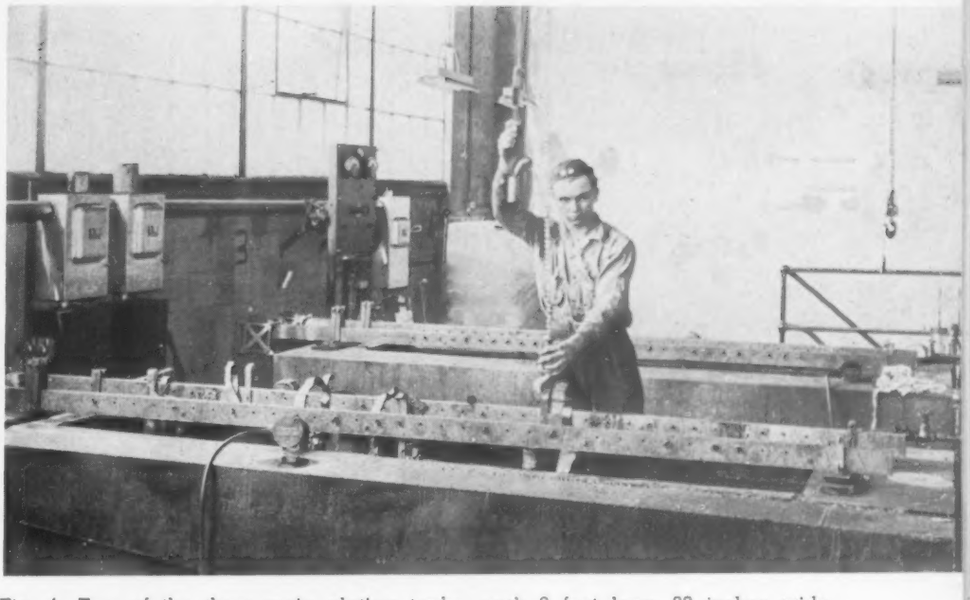

Fig. 4—Two of the three main plating tanks, each 8 feet long, 30 inches wide and 4 feet deep. One of the three has a deep extension which makes available a total depth of 18 feet for handling long or special parts

Another important type of work done at this plant is the salvaging of a large number of worn plug, snap and other types of gages by chromium plating. The process is simplicity itself. The surfaces on which no increase in dimension is desired are blocked off with lacquer and a coat of chromium deposited to a thickness sufficient to bring the gage surfaces to a dimension a few thousandths of an inch over the size required. After plating, the gage then is ground down to correct size. In addition to making it possible to reclaim many otherwise worn out gages, it has been found that gages so rejuvenated will maintain their dimensions much longer.

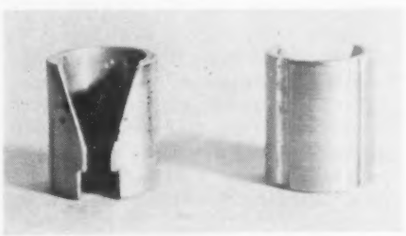

Fig. 5—An expanding bushing made of steel and chromium plated has much longer life than bronze bushing formerly used. Developed by Musselman Hub Brake Co.

While salvaging worn parts is an important portion of the work in this plant, much also is done in building up new parts to protect them from wear in service. An interesting example of such work is the expanding bushing employed in bicycle brakes and shown in Fig. 5. It is 1⅛ inches in diameter and 1¾ inches long. In use, a wedge enters the tapered slot to expand the bushing and afford the braking action desired. As might be imagined, these parts are subject to rapid wear in service.

To increase the effective life of the brake, the outside portion of this bushing is given a chromium coating about 0.015-inch in thickness. This has been found to more than triple the life of the part. It is only one example of many where the life of a new machine part has been greatly lengthened by chromium plating the wearing surfaces.

Allis-Chalmers Improves Its V-Belt Line

■ Allis-Chalmers Mfg. Co., Milwaukee, reports that all its Texrope V-belts are now of the new Super 7 laminated design, based on the Vogt formula. The cords in the new belts are smaller, permitting use of more cords per belt with a resulting greater strength and less stretch. In addition each cord is individually imbedded in heat dissipating rubber to reduce internal belt degeneration.

How To Get WELDING OPERATORS

By HAROLD LAWRENCE
Welding Engineer

Concluding this series on welder training, Mr. Lawrence points out how to set up an apprentice training plan in your own shop—the means generally regarded as best assurance of continued improvement beyond the first level of welding performance

■ CERTAINLY no other industry has experienced a more rapid need for skilled men than has the welding industry. Few other types of plants have expanded from a skilled personnel of 10 men to a trained force of 500 in six years during the comparative calm of peacetime with a decided lull in general business activity.

Today there is talk of needing fifty welders where but one was required before. Welding rods have been on the critical list since the beginning of the defense effort. The only reason why trained welders are not on this same list is that it is restricted to inanimate objects.

Notwithstanding the untiring efforts of private and public welding schools, there is a definite and growing shortage of skilled welders. As discussed last week in section two of this series, the welding school within industry is a source of growing importance. And the third effort that is producing worthwhile results is the apprentice training program within industry.

Apprentice training within industry is a long-term program. This endeavor is not restricted to the development of the elementary basic skills but aims to produce a finished craftsman at the conclusion of the training period which may be several months. The influx of beginning welders may someday satisfy our requirements at this level of skill. But provision has to be made for supplying men of greater abilities for the more exacting welding work. The long-term apprentice training program is regarded as offering the best plan for the continued improvement of welders beyond the first level of welding performance.

In such a program, the trainee may be started to work as a welder's helper or chipper as soon as he is hired, giving him an opportunity to become familiar with welding tools and their uses. In chipping he will see normal irregularities in welding and may question their origin. By being shifted from welder to welder, the welder's helper has an opportunity to see the differences in skill. He should soon discover that the better welders produce more work with less effort.

Outside of regular working hours, the apprentice is trained to hold an arc and run a straight bead. This discussion will deal with arc welding as the plan. Other processes involve a plan differing only in the minor details of equipment and procedure. Every instructional effort is directed toward developing enough ability to allow the apprentice to begin welding just as soon as he can handle the simplest welding job in the plant.

As the novice improves, he is moved from the position of welder's helper to a job in the fabrication department where he is instructed to do simple layout work along with oxygen cutting. Layout work is important to give the tyro an opportunity to see how the gap is bridged between design as represented by blueprints and construction as represented by actual metal. Later, he may be able to apply this knowledge in a constructive report to his foreman on faulty layout and offer suggestions for improving the layout from the welding operator's standpoint. More than once such advice has resulted in speeding production, lowering cost and an improved product.

No small part of the apprentice's value is realized when he is doing cutting. Under the close supervision of the assistant foreman who combines instructional activities with his normal production duties, the beginner is taught the correct operation of the hand cutting and mechanical cutting equipment. This work will contribute to the plant output in addition to providing the embryo welder with a clear insight into the relationship of good cutting practice to the welding operations that follow.

In the fabrication department, the learner is required to clean the oxygen cuts that he makes. Where rough cuts are good enough, high-speed torch cutting may leave at the bottom of the kerf an adhering slag that must be cleaned away.

Careful Explanations Necessary

Cleaning operations of this sort are easy after the beginner has served some time as a welder's helper. The heavy equipment used to clean welds has a lighter counterpart for cleaning oxygen cut pieces. Part of the instruction at this point should be devoted to teaching the apprentice the difference between the time required for a precision cut and for a high-speed cut. Additional cleaning time required for the latter may make total time decidedly less than that for the precision cut. Furthermore, a considerable quantity of cutting gases is saved. All such factors should be explained carefully.

Apprentice training may seem slow, but results will prove its worth. The month or two spent as a welder's helper and in the fabricating department may not have contributed directly to the welding personnel, yet this background is valuable. Too, it has added something to plant output, a recognizable advantage over the welding school.

From fabricating work, the apprentice moves to fitting and tacking. Once more his direction is the responsibility of the assistant foreman in the department. The value of good fitup is explained in terms of lowered welding costs and greater ease of welding. By working examples, the beginner does the work at hand with a full appreciation of its place in the job to come.

Tacking brings the learner into

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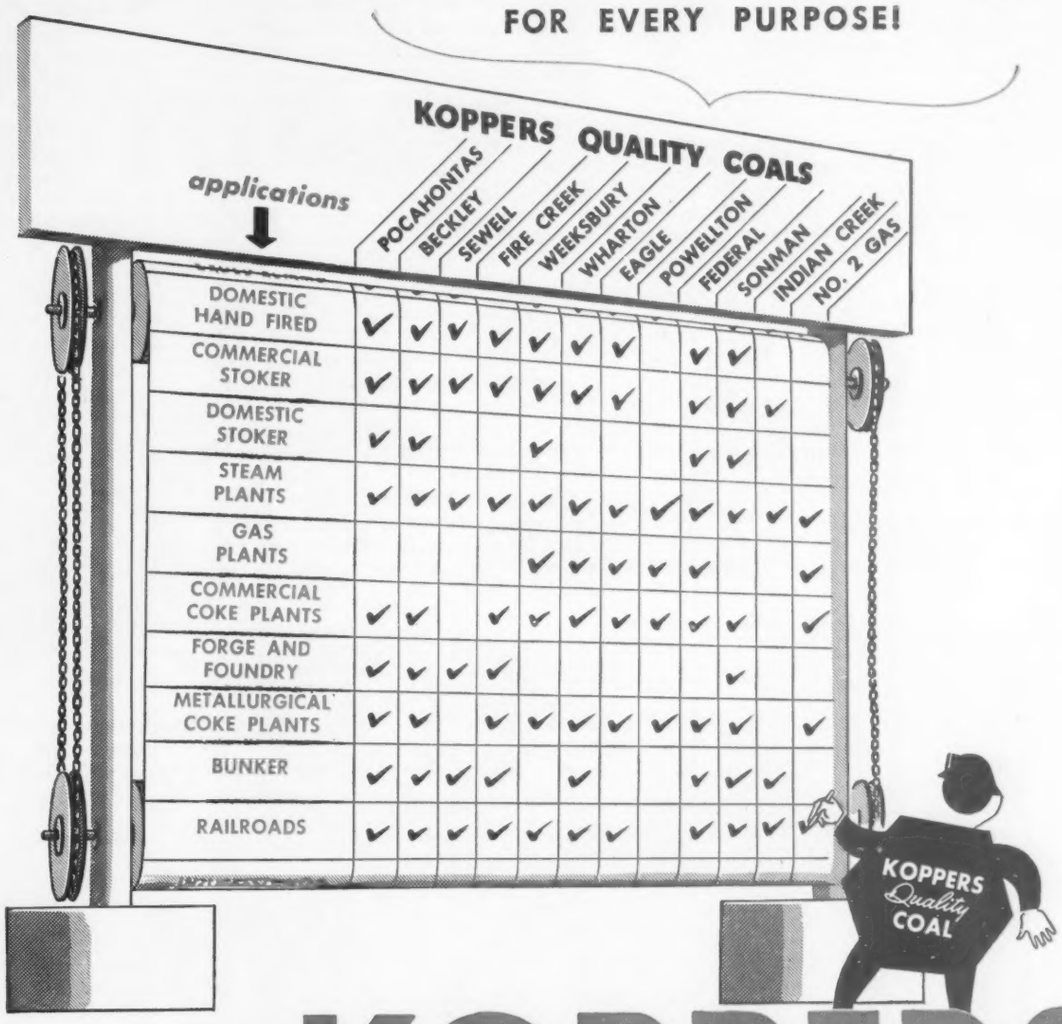

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direct contact with shop welding requirements. The youngster is shown the correct method of making tacks, how enough section must be present in the tack welds to hold the parts in strict alignment during the handling operations that precede the actual production welds, how tack welds must be small enough to keep out of the way of the welds that follow, how the welds must be made in a sequence that will not upset the good fitup that the tack welds are supposed to freeze into the proper place.

Enough fitting and tacking to establish their place in the general scheme of things will be picked up while the apprentice is practicing outside of working hours on the more advanced welding techniques. These manipulations may be learned quickly or they may be acquired slowly, depending upon the aptitude of the apprentice. But once they are mastered, all the preliminary training jobs have been completed and the apprentice is ready to step into line as a production welder.

As impatient as all production men are these days, the required six weeks to three months spent in training the more apt apprentices may appear to be a long time. Yet three months is not much time when you consider that a raw recruit becomes a semi-skilled welder in 90 days. Of course, not all tyros will establish that sort of a record. Six months, or even nine months in training will be about right for many men. There is this consolation, however. The men who learn more slowly usually retain what they are taught very well.

As in the school programs, there will be some in the apprentice training group who will never be able to weld just as some would-be ball players never emerge from the jungles of the lowest class bush leagues. In fairness to all, the inept trainees should be encouraged to do their bit for the defense program in another line. If there is possible employment on other work in the same plant, rearrangement is indicated.

From fitting and tacking to the welding of subassemblies is the next step. Small parts that may be handled easily and that may be positioned to permit downhead welding provide good training. Since the best and least expensive welds are made in this manner, such subassemblies contribute to the best productive effort in any plant.

The right welding sequence may be demonstrated on the subassembly. The value of allowing all possible shrinkage to take place in the subassembly may be pointed out at this time. All welds cause shrinkage. How much better it is to restrict this shrinkage to small units than to allow a cumulative shrinkage in a large assembly is well known to all progressive welding engineers.

Working on these units, the welder puts into practice all he has learned about fitup. Only because he has been trained to seek the best fit possible does he make a true fit wherever he can. Perfect fits, in turn, lead to the most efficient welding. Thus a proper program will have instilled a sound regard for good fabricating practice.

From three to six months, depending upon aptitude of the apprentice and the need for men in the higher classifications, are spent on subassemblies. During this period, the average daily output of the welder should show a steady improvement and the young welder should be gaining confidence in himself. His schooling continues after working hours as long as his instructors think he has unexploited welding ability. Until he reaches the peak of his capabilities, training goes forward.

More difficult than positioned work is the catch-as-catch-can welding of the final assemblies. Frequently these structures are too large to be handled with existing positioning equipment. And unless there are many units of the same general design, the building of handling devices may be more costly than out-of-position welding.

Since vertical and overhead welding call for a higher order of skill, the apprentice will practice them studiously before making his debut on these more exacting welding projects. Many men will have dropped out at the lower levels but the few who have persevered to the top pay brackets will now possess a most valuable skill. They can turn out perfect welds in difficult positions at a satisfactory rate.

Any program for training welding operators involves a goodly amount of actual welding practice—anywhere from 80 to 200 hours. Here a group of students are using five 200-ampere Westinghouse transformer-type welding sets to "get the feel" of alternating-current welding

Graduates Need "Seasoning"

All during the progression from fitting and tacking through the welding of positioned subassemblies to the highest performance on final structures, the apprentices have been under the close supervision of the assistant foreman. This man is a new minor executive in present day welding shop organizations. Charged with responsibility of getting sufficient production of sound quality from the new men, the assistant foreman is the liaison officer between the instructor in the welding practice sessions and the foreman on the firing line.

No welding school graduate whether he comes from private, public or industrial school is prepared for factory work. He needs seasoning under battle conditions common to the industrial plant before he can hold his own with the veterans of the campaign. The roar of the machinery, the seeming confusion of the plant and the haste of men apparently oblivious of the green man detract materially from his progress. Harrassed by a multitude of production orders, the foreman cannot spare the needed time, much as he would like to take a hand personally in the acclimitization of his newest recruit.

Thus the assistant foreman *with no other responsibilities* helps the apprentice avoid the shock of a quick clashing of the inexperienced hand with a well-organized plant routine. With his every initial ef-

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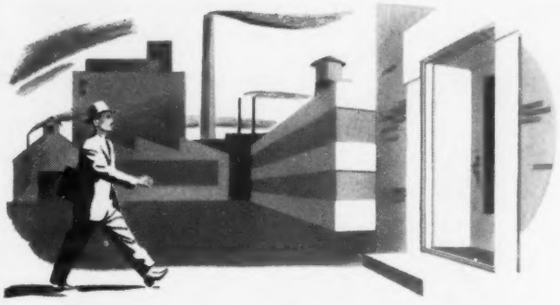

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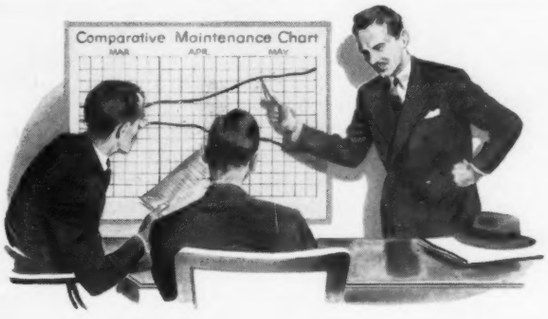

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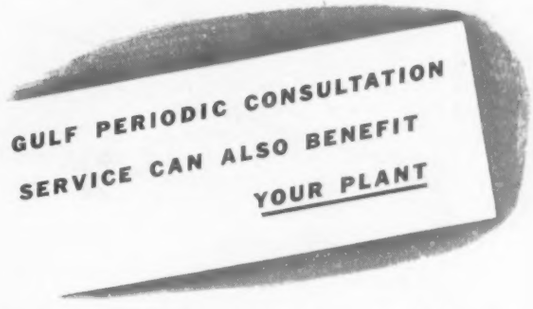

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Gulf Periodic Consultation Service can help you maintain production at peak efficiency.

Take these two steps today . . .

1. Call in a trained Gulf lubrication engineer.
2. Adopt Gulf Periodic Consultation Service.

Gulf Periodic Consultation Service aims to help equipment builders and plant men speed defense production through modern efficient lubrication design and practice. Write or phone your nearest Gulf office today.

GULF OIL CORPORATION · GULF REFINING COMPANY · PITTSBURGH, PA.

GULF INDUSTRIAL LUBRICATION

fort in a strange field under the constant supervision of the assistant foreman, the apprentice welder succeeds in performing the varied tasks common to the large and complicated weldments. He combines accuracy with neatness to produce the type of welds needed for modern services. In as short a time as he can, the welder frees himself from the need of eternal supervision and so leaves the assistant foreman more time to spend with the new group just coming up.

The final stage of training in many plants encompasses the welding of alloys and special products. Preheating and postheating, along with peening, may be added subjects. Here, also, an apprentice training plan starting with afterhours practice and completed under the guidance of the assistant foreman will bring a man without any welding experience at all up to the peak of welding utility.

Another advantage of apprentice training within industry is the wage incentive feature of the plan. Each improvement in welding position within the plant is accompanied by an increase in pay. There is no need for the management to stress the matter of haste. Improvement is sure to follow the quickest and surest path as long as money is the known reward. The usual pressure for increased wages is lacking as each man understands that his pay is limited by his ability and nothing else.

Nothing has been said about blueprint reading, shop mathematics, welding theory and welding metallurgy. Of course these subjects are as important in the apprentice training program as they were in the other methods described in the preceding two articles in this series. But the streamlined course in industry may have no room for them.

These courses require no plant equipment. They may be completed by the men at home. And a sound plan calls for the taking of extension school or correspondence school courses in these essential subjects. A definite amount of outside work is established as a prerequisite to each level of plant work. Certificates of completion are issued by the co-operating schools.

Home study courses cost money. Many plants encourage their men to study by sharing the costs involved. Others refund all costs upon the successful completion of the work. It is recommended that company policy be as liberal as possible. Intelligent employe education and advancement is a surefire antidote for the machinations of communist-inspired agitators.

That there is a definite and growing shortage of welders is acknowledged. That industry can do something about it has been demonstrated. Three alternate routes have been suggested: the public or private welding school in which industrial co-operation is close; the welding school within industry; and apprentice training within industry. Any of these programs is sound if rightly used.

Reports Investigation Of Reinforced Concrete

■ Contrary to previously accepted belief, bond resistance between concrete and steel is not proportional to the compressive strength of standard-cured concrete. Neither is the bond developed by an added length of embedment of bar proportional to the added length of embedment.

These are the conclusions of Professors Gilkey, Chamberlin and Beal in bulletin 147 of the Iowa Engineering Experiment Station, "Bond between Concrete and Steel."

The bulletin presents the results of the investigation, conducted in co-operation with the Highway Research board, of the effect of such variables as length of bar embedment, strength of concrete, and type of bar (plain or deformed), on the bond developed in pull-out, beam or beam-type specimens, between which comparisons are drawn.

The complete study is embodied in the 120-page bulletin which may be obtained without charge from the Iowa Engineering Experiment Station, Iowa State College, Ames, Iowa.

Practical Rules for Supervisory Success

■ *How to Supervise People*, by Alfred M. Cooper; cloth, 150 pages, 5 x 7¼ inches; published by McGraw-Hill Book Co., New York, at $1.75.

A practical discussion making psychology understandable and usable for men in industry, this volume is based on the author's experience with foremen's training groups.

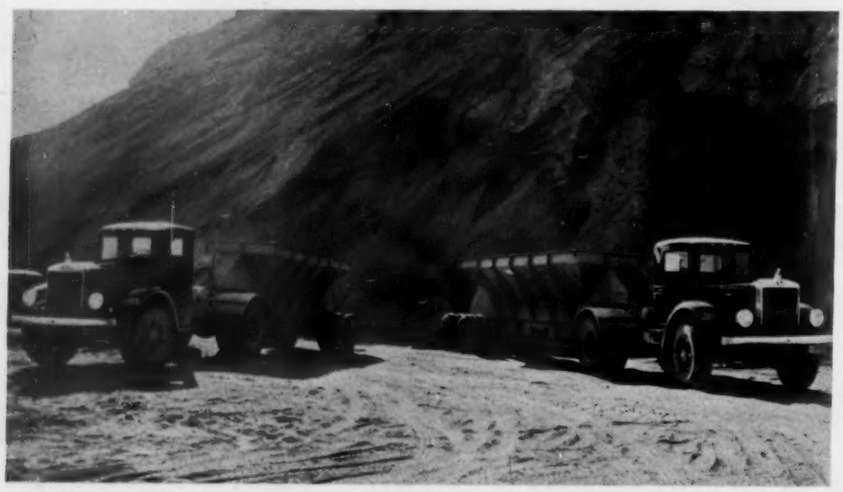
In the 20 years the author was engaged in conducting conferences with experienced supervisors in a wide variety of industries he gathered a large fund of practical material, all of which had been applied successfully. The present volume is the result, reflecting the methods of those who had worked out the procedure.

It is intended as a reference book for supervisors, a textbook for beginners in supervision and a supplementary text for foremanship, supervisory and executive-training conference discussion groups.

Seeks Comment on Proposed Standard

■ A draft of a proposed American standard for steel socket-welding fittings is now being distributed to industry for criticism and comment according to the American Society of Mechanical Engineers, 29 West Thirty-ninth street, New York. It covers over-all dimensions, tolerances and marking for wrought and cast carbon and alloy-steel welding fittings. Copies of the proposal are available on application to C. B. LePage, assistant secretary.

Hopper-Type Trailers Use Welded Construction



■ **All-steel arc-welded hopper-type semitrailers, especially designed for loading and hauling gravel, recently were announced by Landis Steel Construction Co., Picher, Okla. The units haul 30 tons each. Hoppers are fabricated of 8-gage Mayari-R steel with welding equipment supplied by Lincoln Electric Co., Cleveland**

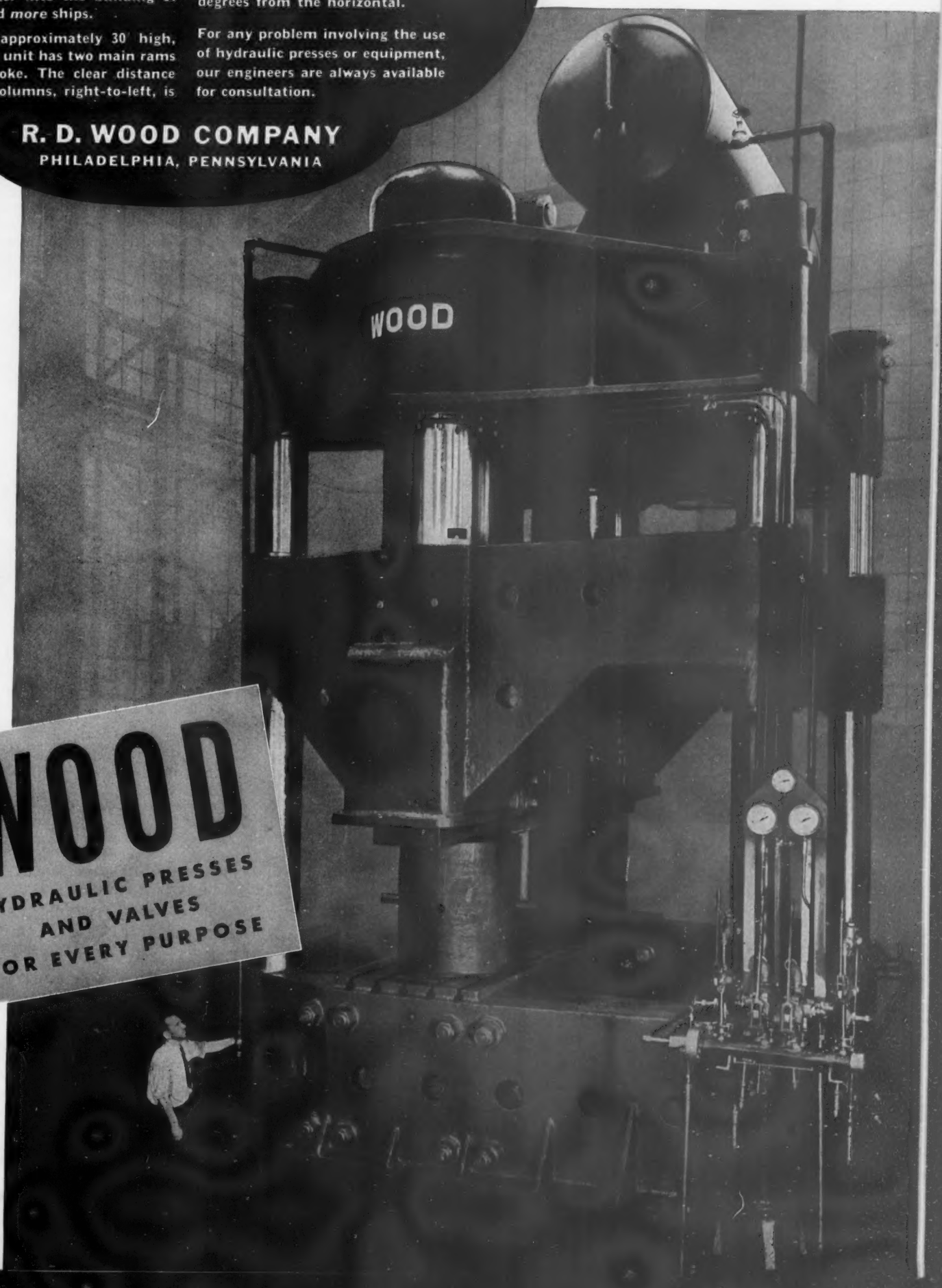
Shipbuilding...

This 1500 ton Wood plate bending and forming press performs a vital part in the numerous operations which enter into the building of ships—and *more* ships.

Standing approximately 30' high, this Wood unit has two main rams of 48" stroke. The clear distance between columns, right-to-left, is 9' 10" and front-to-back is 11' 10". The moving platen can be inclined, front-to-back, as much as 11½ degrees from the horizontal.

For any problem involving the use of hydraulic presses or equipment, our engineers are always available for consultation.

R. D. WOOD COMPANY
PHILADELPHIA, PENNSYLVANIA

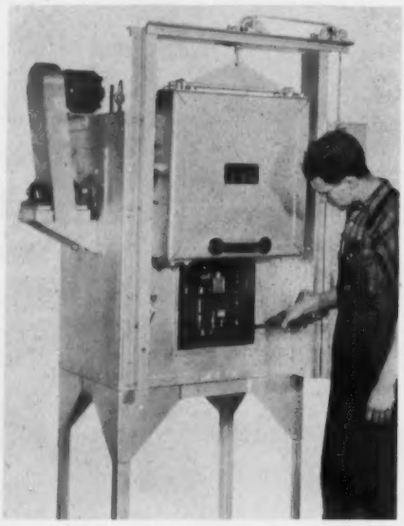


WOOD
HYDRAULIC PRESSES
AND VALVES
FOR EVERY PURPOSE

Industrial Equipment

Heat Treating Furnace

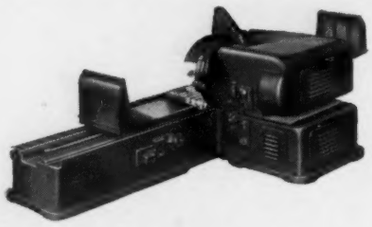
■ Despatch Oven Co., Minneapolis, announces a new CF heat treating furnace which is more adaptable to tool room tempering and drawing work, and to the heat treatment of magnesium alloy castings and general production work requiring a temperature range from 300 to 1200 degrees Fahr. Its body construction is heavier than former units and heavy duty lift doors replace former swing type doors. Fan ca-



pacities also have been increased and method of interior heat distribution and circulation has been modified to give better uniformity. Standard furnaces in this line range from 13 x 13 x 13 to 37 x 37 x 25 inches. They are available with either gas fired or electric heating systems. Prompt delivery can be made to assist those who need this equipment in defense work.

Face Grinder

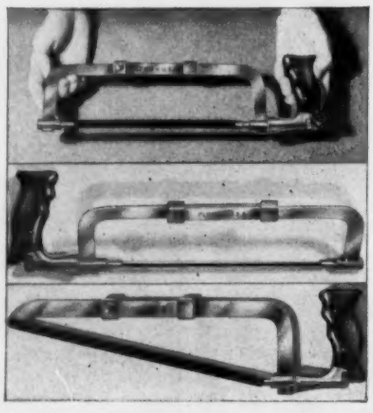
■ Diamond Machine Co., 2447 Aramingo avenue, Philadelphia, announces a new face grinder which features increased speed of production. All of its controls are centralized and the bed has been lengthened so that even at the extreme limits of travel the platen never overhangs. The ways are wider apart, assuring a more rigid foundation for the table. The platen has also been widened to allow mounting a magnetic chuck or for grinding wider parts. The table is driven by pistons mounted in double opposed cylinders, the rods of which are always in tension. The main spindle is driven by V-belts. Wheel head can be rotated horizontally as much as 15 degrees for concave grinding. An improved nozzle directs coolant



against the grinding wheel. Also protection is provided against flying abrasive particles, splashing of coolant, and against grit entering the ways or motor windings. Available in two sizes—30 and 36-inch—the machine requires a floor space of 111 inches front to back and 330 inches end to end, allowing for table clearance. The 30-inch machine accepts work 17½ inches high with front guard in place, or 23½ inches high with guard removed. The 36-inch machine accepts work 23½ inches high with front guard in place, 29½ inches high with front guard removed. The length of work accommodated by either machine is 84 inches.

Hacksaw

■ Plomb Tool Co., 2209 Santa Fe avenue, Los Angeles, announces a new type Firmback hacksaw which features a frame that can be set at any angle with the pistol grip handle. It also incorporates adjustable blade mounts that keep the blade straight at all times, minimizing breakage. The pistol grip handle is



mounted on the frame so as to give direct push and pull action on the blade. It can be turned to any position to get close-up cuts in spite of obstructions. The blade also can be turned and positively set at any angle. The frame is adjustable to take popular lengths of blades, and the blade mounts are movable up or down, on the legs of the frame. A short leg is available for special purposes.

Pneumatic Die Cushions

■ Dayton Rogers Mfg. Co., 2830 Thirteenth avenue, South, Minneapolis, announces a new model CCC pneumatic die cushion. Furnished in double tandem units, it is designed for extremely heavy ring holding pressure on large double-throw single-crank presses and is used excessively on double-crank double-throw presses. Cushions are supplied with a combination regulating valve and pressure gage that controls and regulates all working

draw ring holding pressures. The design of the cylinder section of each cushion automatically shields the working parts of the cushion cylinders so that no pierce slugs nor loose parts can come in contact with the cushion unit. On these larger tandem units, the cushion equipment comes complete with a remote centralized lubricating block or header furnished with leads to the individual cushion cylinders. This type of equipment has ring-holding pressures from 25 to 100 tons, controlled by an automatic reducing regulating valve.

Stoker Coal Crushers

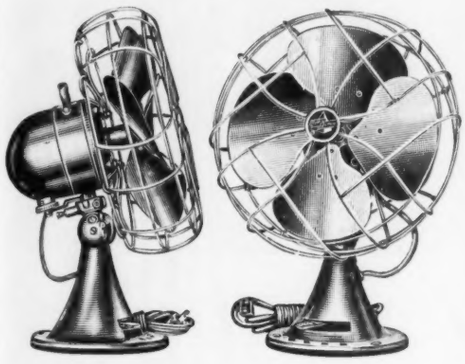
■ McNally Pittsburgh Mfg. Corp., 307 North Michigan avenue, Chicago, announces a design change on its 24 and 36-inch stoker coal crushers. This is in the form of a reversible ratchet adjustment to provide easy, quick adjustment of roll spacing on the units. The ratchet adjustment is applied to one of the adjustment screws of the crushers and coupled through to the adjustment screw on the opposite end of the roll by roller

chain and sprockets. This insures an equal adjustment at both ends of the roll and makes for perfect sizing. An indicator also is provided to show the exact distance of roll movement. As adjustments

are generally confined to a fraction of an inch and rarely ever more than 1 inch, the adjustment may be made in a few seconds, even while the crusher is in operation.

Oscillating Fans

■ Emerson-Electric Mfg. Co., 1824 Washington avenue, St. Louis, has introduced two 3-speed oscillator fans—a 12 and 16-inch unit which feature quiet operation and low current consumption. They are equipped with aluminum blades, ornamental guard and harmonizing blue nameplate. Their construction



features include finger-tip control to adjust arc of oscillation from 90 degrees to any lower range or to stationary position. Their fully enclosed, motor housings conceal and protect moving parts and are sealed against oil leakage.

Instrumentation System

■ Brown Instrument Co., Wayne and Roberts avenues, Philadelphia, announces a new system of instrumentation for plating tanks. Fundamentally it involves direct control of the temperature of the water which is circulated through pipe coils or water jacket rather than indirect control of the circulating water from the temperature of the plating solution.

The system is capable of maintaining a uniform plating temper-

War machines and munitions have to be good to stand up under war conditions. They must be made rapidly in huge quantities by a variety of plants. All parts must be strictly interchangeable.

Hence the task of guarding quality becomes a matter of life and death importance to a nation rearming to preserve its liberty.

Sheffield Visual Gages are stalwart guardians of dimensional quality. They are used in checking dimensions of manufactured and purchased parts, tools, production and master gages.

The sturdy Reed Mechanism, combined with the light beam lever arm, provides a sensitivity to meet the highest precision standards of measurement—but without the delicate fragility so often associated with sensitivity.

These gages are not delicate, they are strong and deadly accurate. They are made in various models to check accurately to thousandths, "tenths" or millionths of an inch and all provide rapid, easy gaging to any limits required on production work.

Write for information.

THE SHEFFIELD CORPORATION
Gage Division · DAYTON, OHIO, U.S.A.

SHEFFIELD MASTER GAGEMAKERS

ature—it saves on amount of steam and cold water necessary due to closeness of temperature control and prolongs the life of the control thermometer because the bulb is not subjected to the destructive action of the plating solution. The system also allows the use of a cheaper bulb construction.

Impulse Timers

■ Weltronic Corp., 3080 East Outer drive, Detroit, announces a line of electronic "impulse" timers for use in conjunction with resistance welding. Comprising two models, the line consists of a semi-automatic, model No. 114 and a high speed automatic, model No. 57 timer. The former is adjustable for "on" time, "weld" time, "cool" time and for any number of interruptions of current desired. The latter, in addition to these adjustments, also has a dial for regulating the "off" time between resistance welds.

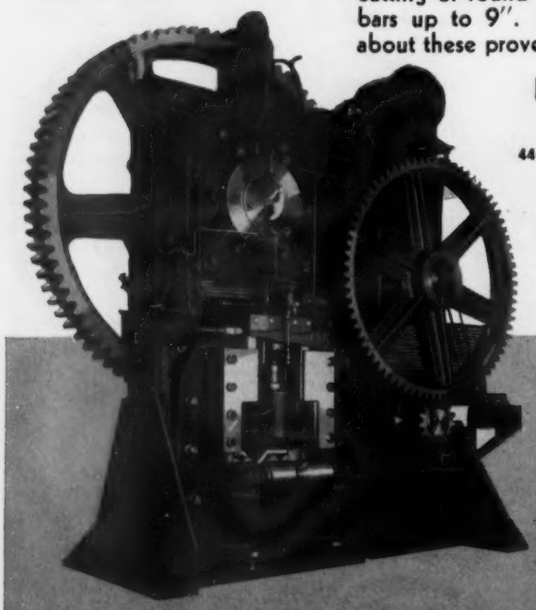
Both models employ electronic tubes, the individual dials being adjustable in single cycle steps (for 60 cycle current) in a range of from 2 to 20 cycles. Number of interruptions can be set for anything from 1 to 10. Also, both models are designed for use in combination with electronic contactors. They may be used with any air or hydraulic pedestal or gun welder, portable or stationary. Air or hydraulic operation is essential, however, since a pressure switch must be used in combination with the timers.

Three "trouble" lights also are provided on the timers. They are connected to the pressure switch, the contactor, and into the "mold" time circuit. In order to provide maximum accuracy of adjustment, two ranges of "weld" time and "number of interruptions" are provided. These are selected by means of toggle switches on the face of the timer—similar to the selection of wave bands in a radio.

if YOU ARE CUTTING STOCK FOR Axles... Shells... Connecting Rods AND OTHER BIG-VOLUME OUTPUT

. . . You'll keep pace with the fastest production schedules—with Buffalo Billet Shears handling the cutting job. Designed for swift efficiency . . . built to stand the gaff of severe, 24-hour-a-day duty . . . easy to control . . . accurate . . . economical to operate. Available in eleven standard sizes, for "one-bite" cutting of round bars up to 10" and square bars up to 9". Better start thinking *Now* about these proven aids to faster production.

Write for brand new Buffalo Billet Shear Bulletin 3295. Just off the press. Full details.



BUFFALO FORGE COMPANY
446 Broadway Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd. Kitchener, Ont.

"Buffalo" BILLET SHEARS

Metal Ring Guard

■ Eclipse Air Brush Co., 400 Park avenue, Newark, N. J., has introduced a new metal ring guard for clamp-type portable air-motored agitators. Acting also as a stand, it protects the propeller from contact with the mixing vessel when in use, and provides an easy means of

storage. The four metal supports that hold the ring in place protect the shaft and prevent it from getting out of alignment. Two metal handles alongside the air motor, at the top of the frame, facilitate lifting the agitator from the mixing vessel.

Pneumatic Tractor Tire

■ B. F. Goodrich Co., Akron, O., is offering a new pneumatic rubber tire for use on industrial tractors. Called the Industrial Tractor Silvertown, it is available in two sizes, 8-24 and 9-24.

It features an unusually thick tread providing adequate traction for off-the-road service as well as

ARE YOU

USING THIS HISTORY-MAKING TURBINE OIL?

THERE'S no need to "put up" with a turbine oil that does only part of the lubrication job. Use the new Shell Turbo Oil—it's the *first* turbine oil to meet the 3 vital requirements of modern turbine lubrication . . .

RUST CONTROL

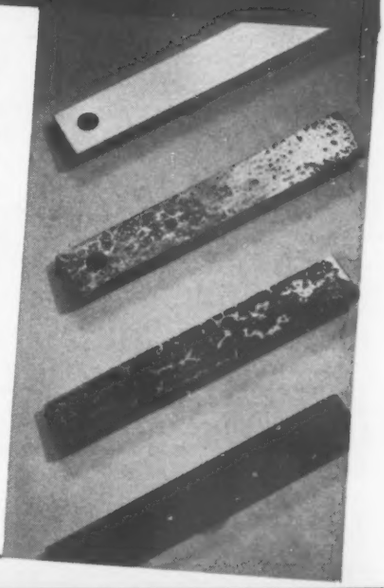
SUPERIOR OXIDATION STABILITY

MINIMUM FOAMING TENDENCY

Why not give the turbines in your plant the benefits of this new lubricant? You'll find a Shell man's recommendations entirely practical—and made without obligation.

THE PROOF!

The 4 steel test strips shown prove that Shell Turbo Oil can prevent rusting. All 4 strips were immersed for 48 hours at 167° F. in 4 well-known turbine oils, mixed with 10% of distilled water and continuously agitated at 1200 R.P.M. Top strip, immersed in Shell Turbo Oil under these severe test conditions, shows no rust. All other strips were badly rusted.



SHELL

SHELL TURBO OIL

long life on highways, ramps and other paved surfaces. Strengthened with Duramin to impart long life, the tire can be used on industrial tractors moving raw materials and finished goods at freight terminals, steamship docks and lumber yards as well as in regular manufacturing plants.

Improved Crane

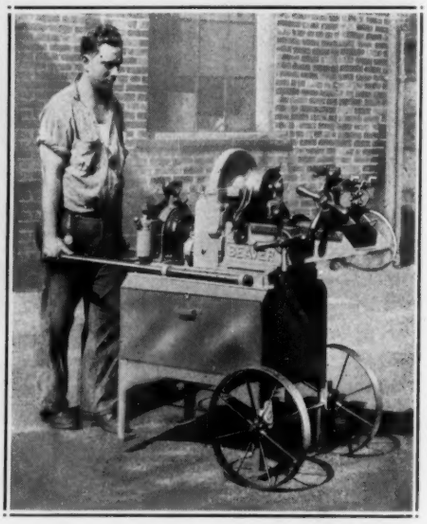
■ General Excavator Co., Marion, O., announces an improved Supercrane adaptable to the many materials handling problems arising from the increasing tempo of defense production. It is capable of high speeds and high lifting capacitites, having a safe lifting capacity of 15 tons. It can be equipped as a clamshell, dragline, pile driver or pull shovel. It has a stronger frame, hydraulic steering and brakes, enclosed transmission and differential.

Power from motor to operating machinery is transmitted by a twin-disk power take-off clutch. The swing and travel motions are controlled by two twin-disk friction clutches. A special brake mounted on the lower end of the vertical intermediate shaft underneath the deck, acts as a swing brake when swinging and as an auxiliary or parking brake when propelling. A special precision hoist brake also permits the backing of the load down through the gears when the engine clutch is disconnected, or permits driving the drum backward, under power.

The main frame is equipped with screw jacks at the front and rear, and has folding outriggers with screw jacks on each side of the machine. All rear wheels are chain driven. In addition to two travel speeds given through the transmission, two additional speeds are available through speed change gears mounted on the deck.

Portable Carriage

■ Warren Steel Specialties Corp., Warren, O., has placed on the market a portable carriage to enable workmen to wheel awkward-to-handle heavy and lightweight but hitherto stationary machines direct to the job. The carriage is constructed of angle iron channel and heavy gage auto body sheets welded together. It has handles for the workmen to lift and guide the apparatus direct to their bench or job. The carriages are available in any practical size. They are ideal in factories which, during this preparedness rush, are crowded; and also for manufacturers where more than one man uses the same tool or machines at different intervals.

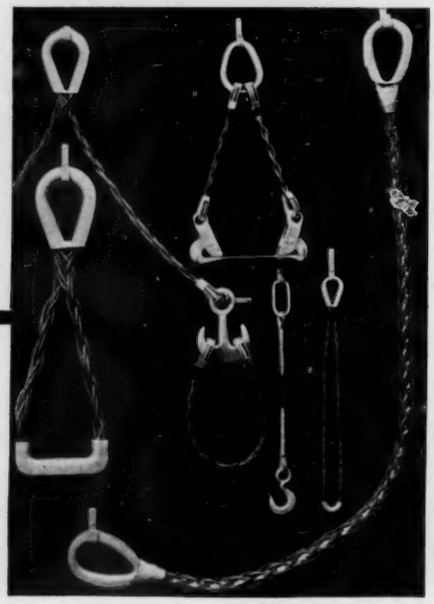


Combination Starter

■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has introduced a new combination starter for mining service to provide remote and automatic control of equipment such as conveyors, pumps and fans. Of direct-current type, its starting and acceleration are accomplished from a built-in or remotely mounted pushbutton.

Safety features include a line disconnecting switch, low voltage protection, combination thermal, instan-

SLINGS for all sorts of LOADS



These and many other constructions and types of braided safety slings are now made exclusively of genuine Yellow Strand Rope.

Try Yellow Strand Plaited Safety Slings for handling "problem" loads in steel mill and foundry—irregular castings, steel rolls, huge transformers, etc. No shifting or slipping, no marring of highly finished steel—and no load too heavy—for these amazingly flexible, soft, kink-resistant and durable slings.

All plaited safety slings made under the original Murray Patents* are now manufactured by our company, exclusively, and only genuine Yellow Strand is used—the rope unsurpassed in quality and stamina.

Our engineering department is prepared to design a special Yellow Strand Plaited Safety Sling for any special problem.

Broderick & Bascom Rope Co., St. Louis

Branches: New York, Chicago, Houston, Portland, Seattle

Y-13

Yellow Strand Plaited Safety Slings

* Murray Patents: U. S. Patents 1475859; 1524671; Canadian Patents 252874, 258068

FREE RIGGERS' HAND BOOK

Contains full data on Plaited Safety Slings, standard Yellow Strand Slings, fittings, etc. No charge, of course.

IT TAKES "*knowing how*" TO MAKE GOOD WIRE

(One of a series of advertisements illustrating the importance of quality control in the manufacture of American Quality Wires.)

1 **AMERICAN WIRE QUALITY** begins in our own mines, source of the finest ore in America. This is an advantage enjoyed by comparatively few in the wire-making field, and is a primary factor in quality control.

2 **AT THE BLAST FURNACES** the basic materials are carefully tested, weighed, and then blended—and the chemical and physical properties of the "cast" are constantly checked and rechecked to assure proper control of quality.

3 **POSITIVE ASSURANCE OF QUALITY** in the open hearth is maintained by the use of our own iron and raw materials. The refining is done in furnaces equipped with the latest control features, and under the supervision of skilled operators.

4 **FROM INGOTS TO BILLETS.** Again the hand of long experience and watchful control becomes the protection of quality. Heated to a uniform temperature throughout, the glowing ingots pass and repass through giant rolls, finally emerge as steel billets, reduced to proper dimensions and cut to desired lengths.

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Export Company, New York

AMERICAN *Quality* WIRES FOR MANUFACTURING PURPOSES

USS **UNITED STATES STEEL**

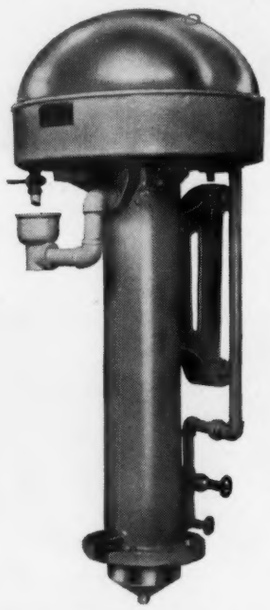
taneous overload protection and safety interlocks to prevent opening the door until the switch is off. When an accurate definite motor speed is desired, a small adjustable field rheostat may be added which provides up to 15 per cent increase in speed.

Hand-Operated Siren

■ Federal Electric Co. Inc., 8739 South State street, Chicago, has introduced a new Model G hand-operated siren for civil, military or industrial use. Available in two styles, it is compact, light in weight and features a powerful tone. Model G-1 is furnished with a flat base bracket for stationary installation on any flat surface, while model G-2, similar in design, is equipped with a hand grip, shoulder strap and case for portable use. Ball-bearing motor shaft of the siren assures smooth operation and long wear. The gearing is made to provide maximum sound volume with minimum cranking effort.

Water Stills

■ F. J. Stokes Machine Co., Philadelphia, has introduced improved steam-heated, single-effect automatic water stills, in capacities from 10 to 100 gallons per hour, for use in producing pure distillate for exacting laboratory and industrial purposes. One improvement incorporated in them is a high-speed vapor-baffle system designed so it increases the velocity of the water vapor, at the same time reversing its direction of flow three times between the top of the boiling chamber and the point at which it enters the condenser. Another feature of these stills is a new light-weight one-piece copper cover readily removable for inspecting and cleaning the steam-coils, boiler chamber and other parts. Covers are water-sealed, a positive seal being obtained without the use of gaskets and fastenings of any kind. The stills are all "hard water" models, equipped with



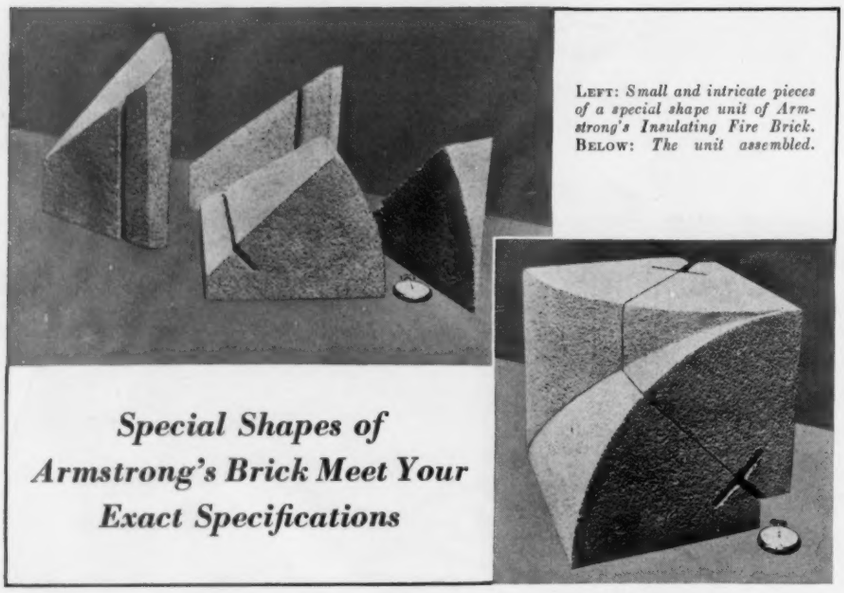
automatic "bleeder" devices to continuously remove scale-forming solid materials that are concentrated in the boiling chambers.

Ratchet Wrenches

■ J. H. Williams & Co., 225 Lafayette street, New York, recently placed on the market a new midget pattern reversible ratchet wrench. It has a ¼-inch square drive and

measures 4½ inches long, incorporating the same patented double-tooth pawl for both "on" and "off" rotation as is used in other Superratchet wrenches. A convenient shift lever at the head instantly reverses the wrench action. The handle is drop-forged from high tensile carbon steel—working parts are machined from chromium-molybdenum steel. The wrench is finished in chromium-plate over nickel.

PERFECT FIT FOR A DIFFICULT FURNACE CONTOUR



LEFT: *Small and intricate pieces of a special shape unit of Armstrong's Insulating Fire Brick.* BELOW: *The unit assembled.*

Special Shapes of Armstrong's Brick Meet Your Exact Specifications

YOU can expect excellent workmanship when you send special shape specifications to Armstrong. Whether you need large units or small and intricate ones Armstrong engineers and skilled workmen can design and produce them to meet your exact needs.

There are good reasons for the workmanship and quality you get in Armstrong's Special Shapes. First: These shapes are made by specialists working in a well equipped department. Second: The uniformity, strength, and workability of all five classes of Armstrong's Brick make it possible to follow your most difficult specifications within strictest tolerances.

Using special shapes results in a better fit with fewer joints and tighter joints, truer contours, greater strength and durability, and saves installation labor. For domes, jack arches, and for many other individual design problems special shapes help to get the job done right.

Furnace builders making shapes to meet their own needs can relieve the congestion of work in their shops by ordering at least part of their requirements from us. Bring us your special shape problems, or any other insulation problem you may have. Armstrong Cork Company, Building Materials Division, 985 Concord Street, Lancaster, Pa.

Armstrong's
HIGH TEMPERATURE INSULATION

Steelmakers Rationing Ever More Strictly

Considerations are quantities used last year, stocks on hand and sometimes distances from plants. Civilian hysteria unjustified.

MARKET IN TABLOID ★

Demand

Bulge in defense inquiries past week.

Prices

Still quoted "in effect at time of shipment."

Production

Up 4 points to 97½ per cent.

■ MILD HYSTERIA which developed last week on the part of many civilian steel users is in large measure unjustified. So far the worst suffering among consumers has taken the form of pinches and inconveniences, with but very few cases where steel shortage has halted production lines.

Pinches come mostly from alloy steel shortages. For example, taps, made of special steel, are under priorities—but the same taps can be used for civilian purposes. Aggravating the apparent strain on civilian needs is the fact that some consuming plants are working at 100 per cent of capacity, contraseasonally, making products now in full force which would normally be made next winter. Often such full operations are due to insistence of suppliers that the material be taken into consuming plants immediately.

Meanwhile the civilian situation should become better as various adjustments are made. Rationing on part of steelmakers becomes stricter and juster; many less essential projects are being abandoned. Substitutes for steel are often being made for the duration. Taxes and other government impositions will tend automatically to restrict civilian uses. Part of the hysteria is reflection on possible distress of the future rather than conditions of the present, as well as to false rumors circulated.

Instances multiply of borderline cases between defense and nondefense. Thus a public utility which supplies power to defense plants cannot get priorities on its raw materials. A maker of steel strapping, used widely in packaging and by steelmakers themselves on defense shipments, has no priority rating.

More interesting examples of use of substitutes for the duration come to light. A prominent state contemplates use of plastics in place of sheet steel for 1943 auto license plates. A maker of ventilating fans is making blades of wood.

Clever devices for rationing steel are being put into effect. Thus a maker of standard pipe not only rations pipe with respect to quantities bought in recent years, but with respect to quantity already on hand, and, what is more novel, with respect to distance from the source of supply. Thus a distributor near the mill is allowed two months' supply; one on the Pacific Coast, six months' supply.

Some companies employ the general principle in doling out steel of supplying only amounts furnished in previous years, thus devoting their excess production over those years to filling defense orders. The best brains of the industry are wrestling with the distribution problem and are doing well under the circumstances.

Many steel companies report decreasing volume of orders. Certain warehouse distributors find more moderate inquiries, both as to number and tonnages.

Smaller mills are taking advantage of a new OPACS ruling, whereby mills can quote on the basing point nearest the point where the product is produced, which means in effect quoting of f.o.b. mill prices, passing freight charges along to customers. Some of these producers recently have been operating without profit owing to higher costs.

Steel ingot production for the first half of 1941 was 40,911,886 net tons, or within 20 per cent of total steel production for the entire world war year of 1917, up 40 per cent over first half, 1940.

Finished steel shipments by United States Steel Corp. of 1,668,637 net tons established an all-time high for that month, the previous record having been in 1917 at 1,558,444 net tons.

Automobile production last week recovered from the holiday curtailment by 17,861 units, 114,318 having been scheduled, as against 62,176 for the like week of 1940.

Details have been settled for the allocation of 625,000 tons of semifinished steel for Britain, for shipment before third quarter.

Steel ingot production last week gained 4 points to 97½ per cent as a recovery from the holiday. An exception to the rising trend was Chicago, down 1 point to 100½ per cent and three unchanged districts, Birmingham and New England at 90, and St. Louis at 98. Advances were as follows: Buffalo 17½ points to 93, Cincinnati 6½ points to 88, Detroit 13 points to 96, eastern Pennsylvania 5 points to 97, Pittsburgh 2 points to 99½, Wheeling 4 points to 91 and Cleveland 4 points to 96½.

STEEL's three composite price groups for last week were unchanged: iron and steel at $38.15, finished steel at $56.60 and steelworks scrap at $19.16.

COMPOSITE MARKET AVERAGES

	July 12	July 5	June 28	One Month Ago June, 1941	Three Months Ago April, 1941	One Year Ago July, 1940	Five Years Ago July, 1936
Iron and Steel	$38.15	$38.15	$38.15	$38.15	$38.15	$37.63	$33.49
Finished Steel	56.60	56.60	56.60	56.60	56.60	56.60	53.40
Steelworks Scrap..	19.16	19.16	19.16	19.16	19.16	18.56	12.89

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	July 12, 1941	June 1941	April 1941	July 1940
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Iron bars, Chicago	2.25	2.25	2.25	2.25
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.21	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv. Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	July 12, 1941	June 1941	April 1941	July 1940
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$24.34
Basic, Valley	23.50	23.50	23.50	22.50
Basic, eastern, del. Philadelphia	25.34	25.34	25.34	24.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	23.69
No. 2 foundry, Chicago	24.00	24.22	24.22	23.00
Southern No. 2, Birmingham	20.38	20.38	20.38	19.38
Southern No. 2, del. Cincinnati	24.06	24.06	24.06	23.06
No. 2X, del. Phila. (differ. av.)	26.215	26.215	26.215	25.215
Malleable, Valley	24.00	24.00	24.00	23.00
Malleable, Chicago	24.00	24.00	24.00	23.00
Lake Sup., charcoal, del. Chicago	31.34	31.34	30.34	30.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	23.17
Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.20	$19.55
Heavy melt. steel, No. 2, E. Pa.	17.75	17.75	18.00	17.50
Heavy melting steel, Chicago	18.75	18.75	18.80	17.45
Rails for rolling, Chicago	22.25	22.25	22.65	21.65
No. 1 Cast, Chicago	20.00	21.50	22.31	16.95

Coke

Connellsville, furnace, ovens	$6.25	$6.25	$5.50	$4.75
Connellsville, foundry, ovens	7.25	7.25	6.00	5.75
Chicago, by-product fdry., del.	12.25	12.25	11.85	11.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel

Hot Rolled

Pittsburgh	2.10c
Chicago, Gary	2.10c
Cleveland	2.10c
Detroit, del.	2.20c
Buffalo	2.10c
Sparrows Point, Md.	2.10c
New York, del.	2.34c
Philadelphia, del.	2.27c
Granite City, Ill.	2.20c
Middletown, O.	2.10c
Youngstown, O.	2.10c
Birmingham	2.10c
Pacific Coast ports	2.65c

Cold Rolled

Pittsburgh	3.05c
Chicago, Gary	3.05c
Buffalo	3.05c
Cleveland	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.37c
New York, del.	3.39c
Granite City, Ill.	3.15c
Middletown, O.	3.05c
Youngstown, O.	3.05c
Pacific Coast ports	3.70c

Galvanized No. 24

Pittsburgh	3.50c
Chicago, Gary	3.50c
Buffalo	3.50c
Sparrows Point, Md.	3.50c
Philadelphia, del.	3.67c
New York, delivered	3.74c
Birmingham	3.50c
Granite City, Ill	3.60c
Middletown, O.	3.50c
Youngstown, O.	3.50c
Pacific Coast ports	4.05c

Black Plate, No. 29 and Lighter

Pittsburgh	3.05c
Chicago, Gary	3.05c
Granite City, Ill.	3.15c

Long Ternes No. 24 Unassorted

Pittsburgh, Gary	3.80c
Pacific Coast	4.55c

Enameling Sheets

	No. 10	No. 20
Pittsburgh	2.75c	3.35c
Chicago, Gary	2.75c	3.35c
Granite City, Ill.	2.85c	3.45c
Youngstown, O.	2.75c	3.35c
Cleveland	2.75c	3.35c
Middletown, O.	2.75c	3.35c
Pacific Coast	3.40c	4.00c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 303	No. 304
Bars	24.00	26.00	25.00
Plates	27.00	29.00	29.00
Sheets	34.00	36.00	36.00
Hot strip	21.50	27.00	23.50
Cold strip	28.00	33.00	30.00

20% Ni.-Cr. Clad

Plates	18.00*
Sheets	19.00

**Annealed and pickled*

Straight Chromes

	No. 410	No. 416	No. 430	No. 442
Bars	18.50	19.00	19.00	22.50
Plates	21.50	22.00	22.00	25.50
Sheets	26.50	27.00	29.00	32.50
Hot strip	17.00	18.25	17.50	24.00
Cold stp.	22.00	23.50	22.50	32.00

Steel Plate

Pittsburgh	2.10c
New York, del.	2.29c-2.54c
Philadelphia, del.	2.15c
Boston, delivered	2.42c-2.57c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, Pa.	2.10c-2.35c
Sparrows Point, Md.	2.10c-2.35c
Claymont, Del.	2.10c-2.35c
Youngstown	2.10c
Gulf ports	2.45c
Pacific Coast ports	2.65c

Steel Floor Plates

Pittsburgh	3.35c
Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	4.00c

Structural Shapes

Pittsburgh	2.10c
Philadelphia, del.	2.21½c
New York, del.	2.27c
Boston, delivered	2.41c
Bethlehem	2.10c
Chicago	2.10c
Cleveland, del.	2.30c
Buffalo	2.10c
Gulf ports	2.45c
Birmingham	2.10c
St. Louis, del.	2.34c
Pacific Coast ports	2.75c

Tin and Terne Plate

Tin Plate, Coke (base box)

Pittsburgh, Gary, Chicago	$5.00
Granite City, Ill.	5.10

Mfg. Terne Plate (base box)

Pittsburgh, Gary, Chicago	$4.30
Granite City, Ill.	4.40

Roofing Ternes

Pittsburgh base, package 112 *sheets* 20 x 28 *in., coating I.C.*

8-lb.	$12.00	25-lb.	$16.00
15-lb.	14.00	30-lb.	17.25
20-lb.	15.00	40-lb.	19.50

Bars

Hot-Rolled Carbon Bars

Pittsburgh, Chicago, Gary, Cleve., Birm., base 20 tons one size	2.15c
Detroit, del.	2.25c
New York, del.	2.49c
Duluth, base	2.25c
Philadelphia, del.	2.47c
Gulf ports, dock	2.50c
All-rail	2.59c
Pac. ports, dock	2.80c
All-rail	3.25c

Rail Steel Bars

Pitts., Chicago, Gary, Cleveland, Birm., base 5 tons	2.15c
Detroit, del.	2.25c
New York, del.	2.49c
Philadelphia, del.	2.47c
Gulf ports, dock	2.50c
All-rail	2.59c

Pac. ports, dock 2.80c
All-rail 3.25c

Hot-Rolled Alloy Bars

Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size 2.70c
Detroit 2.80c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.70	3300	3.80
2500	2.55	3400	3.20
4100	.15-25 Mo.		0.55
4600	0.20-0.30 Mo.; 1.50-2.00 Ni.		1.20
5100	80-1.10 Cr.		0.45
5100	Spr. flats		0.15
6100	Bars		1.20
6100	Spr. flats		0.85
Carb., Van.			0.85
9200	Spr. flats		0.15
9200	Spr. rounds, squares		0.40
T 1300, Mn, mean 1.51-2.00			0.10
Do., carbon under 0.20 max.			0.35

Cold-Finished Carbon Bars

Pitts., Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs. 2.65c
Detroit 2.70c

Cold-Finished Alloy Bars

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c
Detroit 3.45c
Galveston, add $0.25; Pacific Coast, $0.50.

Turned, Ground Shafting

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c
Detroit 2.70c

Reinforcing Bars (*New Billet*)

Pittsburgh, Chicago, Gary, Cleveland, Birm., Sparrows Point, Buffalo, Youngstown, base..... 2.15c
Gulf ports, dock..... 2.50c
All-rail 2.59c
Pacific ports, dock 2.80c
All-rail 3.25c
Detroit, del. 2.25c

Reinforcing Bars (*Rail Steel*)

Pittsburgh, Chicago, Gary, Cleveland, Birm., base. 2.15c
Gulf ports, dock 2.50c
All-rail 2.59c
Pacific ports, dock..... 2.80c
All-rail 3.25c
Detroit, del. 2.25c

Iron Bars

Philadelphia, del. ...3.06-3.50c
Chicago 2.25c
Pittsburgh, muck bar, .. 5.00c
Pittsburgh, staybolt 8.00c
Terre Haute 2.15c

Wire Products

Pitts.-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails..... $2.55
(Per Pound)
Polished fence staples.. 2.55c
Annealed fence wire.... 3.05c
Galv. fence wire 3.40c
Woven wire fencing (base C. L. column) 67
Single loop bale ties, (base C.L. column) ... 59
Galv. barbed wire, 80-rod spools, base column .. 70
Twisted barbless wire, column 70

To Manufacturing Trade

Base, Pitts.-Cleve.-Chicago Birmingham (except spring wire)

Bright bess., basic wire. 2.60c
Galvanized wire 2.60c
Spring wire 3.20c
Worcester, Mass., $2 higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg..$3.85

Alloy Plates (Hot)

Pittsburgh, Chicago, Coatesville, Pa. 3.50c

Strip and Hoops

(Base, hot strip, 1 ton or over; cold, 3 tons or over)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham 2.10c
Detroit, del. 2.20c
Philadelphia, del. 2.42c
New York, del. 2.46c
Pacific Coast ports ... 2.75c
Cooperage hoop, Young., Pitts.; Chicago, Birm. 2.20c
Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown 2.80c
Chicago 2.90c
Detroit, del. 2.90c
Worcester, Mass. ... 3.00c

Carbon	Cleve.,	Pitts.
0.26—0.50		2.80c
0.51—0.75		4.30c
0.76—1.00		6.15c
Over 1.00		8.35c

Worcester, Mass. $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown 2.95c
Chicago 3.05c
Detroit, del. 3.05c
Worcester, Mass. 3.35c
Lamp stock up 10 cents.

Rails, Fastenings

(Gross Tons)

Standard rails, mill $40.00
Relay rails, Pittsburgh 20—100 lbs. 32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham. $40.00
Do., rerolling quality.. 39.00

Cents per pound

Angle bars, billet, mills. 2.70c
Do., axle steel 2.35c
Spikes, R. R. base 3.00c
Track bolts, base 4.15c
Car axles forged, Pitts., Chicago, Birmingham. 3.15c
Tie plates, base 2.15c
Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller.....65½ off
Do., ⅞ and ⅝ x 6-in. and shorter.....63½ off
Do., ⅝ to 1 x 6-in. and shorter .....61 off
1¼ and larger, all lengths 59 off
All diameters, over 6-in. long .....59 off
Tire bolts .....50 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.
Step bolts .....56 off
Plow bolts .....65 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less.	62	64
⅝-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger..	56	..

Hexagon Cap Screws

Upset 1-in., smaller .....64 off

Square Head Set Screws

Upset, 1-in., smaller.....71 off
Headless set screws.....60 off

Piling

Pitts., Chgo., Buffalo .. 2.40c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural 3.75c
½ inch and under.....65-5 off
Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. .....$4.25 off

Tool Steels

Pittsburgh base, cents per lb.

Carb. Reg. 14.00 Oil-hardening .. 24.00
Carb. Ext. 18.00
Carb. Spec. 22.00 High car.-chr. 43.00

High Speed Tool Steels

Tung.	Chr.	Van.	Moly.	
18.00	4	1	...	67.00
18.00	4	2	1	77.00
18.00	4	3	1	87.00
1.5	4	1	8.5	54.00
....	4	2	8	54.00
5.5	4	1.5	4	57.50

Welded Iron, Steel, Pipe

Base discounts on steel pipe. Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on lap weld, 1 point less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Galv.
½	63½	51
¾	66½	55
1—3	68½	57½
Iron		
¾	30	10
1—1¼	34	16
1½	38	18½
2	37½	18

Lap Weld

Steel

2	61	49½
2½—3	64	52½
3½—6	66	54½
7 and 8	65	52½
Iron		
2	30½	12
2½—3½	31½	14½
4	33½	18
4½—8	32½	17
9—12	28½	12

Line Pipe

Steel

1 to 3, butt weld	67½
2, lap weld	60
2½ to 3, lap weld	63
3½ to 6, lap weld	65
7 and 8, lap weld	64

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cutlengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½"O.D.	13	$ 9.72	$23.71
1¾"O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼"O.D.	13	13.79	21.68
2¼"O.D.	12	15.16	....
2½"O.D.	12	16.58	26.57
2¾"O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½"O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1" O.D.	13	$ 7.82	$ 9.01
1¼"O.D.	13	9.26	10.67
1½"O.D.	13	10.23	11.79
1¾"O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼"O.D.	13	14.54	16.76
2½"O.D.	12	16.01	18.45
2½"O.D.	12	17.54	20.21
2¾"O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½"O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½"O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Per Net Ton

6-in., & over, Birm..$45.00-46.00
4-in., Birmingham.. 48.00-49.00
4-in., Chicago 56.80-57.80
6-in. & over, Chicago 53.80-54.80
6-in. & over, east fdy. 49.00
Do., 4-in. 52.00
Class A Pipe $3 over Class B
Stnd. fitgs., Birm., base $100.00.

Semifinished Steel

Rerolling Billets, Slabs

(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Youngs., Birm., Sparrows Point..$34.00
Duluth (billets) 36.00
Detroit, delivered 36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young, Buffalo, Birm.. 40.00
Duluth 42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point Buffalo, Canton, Chicago. 34.00
Detroit, delivered 36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅜-inch incl. (per 100 lbs.) $2.00
Do., over ⅜ to 41/64-in. incl. 2.15
Worcester up $0.10; Galveston up $0.25; Pacific Coast up $0.50.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt. 1.90c

Shell Steel

Pittsburgh, Chicago, base, 1000 tons of one size, open hearth

3-12-inch $52.00
12-18-inch 54.00
18-inch and over 56.00

Coke

Price Per Net Ton

Beehive Ovens

Connellsville, fur... $6.00- 6.25
Connellsville, fdry.. 7.00- 7.50
Connell. prem. fdry. 7.25- 7.60
New River fdry. ... 8.00- 8.25
Wise county fdry. .. 7.50
Wise county fur. .. 6.50

By-Product Foundry

Newark, N. J., del... 12.60-13.05
Chicago, outside del. 11.50
Chicago, delivered . 12.25
Terre Haute, del. .. 11.75
Milwaukee, ovens.. 12.25
New England, del... 13.75
St. Louis, del. 12.25
Birmingham, ovens. 8.50
Indianapolis, del. .. 12.00
Cincinnati, del. ... 11.75
Cleveland, del. 12.30
Buffalo, del. 12.50
Detroit, del. 12.25
Philadelphia, del. .. 12.38

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol... 14.00c
Toluol, two degree 27.00c
Solvent naphtha 26.00c
Industrial xylol 26.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.) 14.25c
Do. (1000 lbs. or over) 13.25c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers 7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia....$30.00

Pig Iron

No. 2 foundry is 1.75-2.25 sil.; 50c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$25.00	$25.50	$24.50	$26.00
Birmingham, Ala.§	20.38	.....	19.38	25.00
Birdsboro, Pa.	25.00	25.50	24.50	26.00
Buffalo	24.00	24.50	23.00	25.00
Chicago	24.00	24.00	23.50	24.50
Cleveland	24.00	24.00	23.50	24.50
Detroit	24.00	24.00	23.50	24.50
Duluth	24.50	24.50	.....	25.00
Erie, Pa.	24.00	24.50	23.50	25.00
Everett, Mass.	25.00	25.50	24.50	26.00
Granite City, Ill.	24.00	24.00	23.50	24.50
Hamilton, O.	24.00	24.00	23.50	....
Neville Island, Pa.	24.00	24.00	23.50	24.50
Provo, Utah	22.00	.....	.....	.....
Sharpsville, Pa.	{24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00
Sparrow's Point, Md.	25.00	.....	24.50	.....
Swedeland, Pa.	25.00	25.50	24.50	26.00
Toledo, O.	24.00	24.00	23.50	24.50
Youngstown, O.	{24.00–24.50	24.00–24.50	23.50–24.50	24.50–25.00

§Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:				
Akron, O., from Cleveland	25.39	25.39	24.89	25.89
Baltimore from Birmingham†	25.61	.....	25.11	.....
Boston from Birmingham†	25.12	.....	.....	.....
Boston from Everett, Mass.	25.50	26.00	25.00	26.50
Boston from Buffalo	25.50	26.00	25.00	26.50
Brooklyn, N. Y., from Bethlehem	27.50	28.00	.....	.....
Canton, O. from Cleveland	25.39	25.39	24.89	25.89
Chicago from Birmingham	†24.22	.....	.....	.....
Cincinnati from Hamilton, O.	24.44	25.11	24.61	.....
Cincinnati from Birmingham†	24.06	.....	23.06	.....
Cleveland from Birmingham†	24.12	.....	23.12	.....
Mansfield, O., from Toledo, O.	25.94	25.94	25.44	.....
Milwaukee from Chicago	25.10	25.10	24.60	25.60
Muskegon, Mich., from Chicago, Toledo or Detroit	27.19	27.19	.....	.....
Newark, N. J., from Birmingham†	26.15	.....	.....	.....
Newark, N. J., from Bethlehem	26.53	27.03	.....	.....
Philadelphia from Birmingham†	25.46	.....	24.96	.....
Philadelphia from Swedeland, Pa.	25.84	26.34	25.34	.....

Pittsburgh dist.: Add to Neville Island base, North and South Sides, 69c; McKees Rocks, 55c; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, 84c; Monessen, Monongahela City, $1.07; Oakmont, Verona, $1.11; Brackenridge, $1.24.

	No. 2 Fdry.	Malleable	Basic	Bessemer
Saginaw, Mich., from Detroit	26.31	26.31	25.81	26.81
St. Louis, northern	24.50	24.50	24.00	.....
St. Louis from Birmingham	†24.12	.....	23.62	.....
St. Paul from Duluth	26.63	26.63	.....	27.13

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50, base; $30.74 delivered Philadelphia.

Gray Forge		Charcoal	
Valley furnace	$23.50	Lake Superior fur.	$28.00
Pitts. dist. fur.	23.50	do., del. Chicago	31.34
		Lyles, Tenn., high phos.	28.50

Silvery

Jackson county, O., base, 6.00 to 6.50 per cent $29.50. Add 50 cents for each additional 0.25 per cent of silicon. Buffalo base $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

Manganese differentials in silvery iron and ferrosilicon not to exceed 50 cents per 0.50 per cent manganese in excess of 1 per cent.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$64.60

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00

Second Quality

Pa., Ill., Ky., Md., Mo.	46.55
Georgia, Alabama	41.80
New Jersey	49.00

Ohio

First quality	43.00
Intermediate	36.10
Second quality	36.00

Malleable Bung Brick

All bases	$59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press	$31.00
Wire cut	29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, duty pd., tide, net ton	$25.00-$26.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	20.00-21.00
Do. barge	20.00
No. 2 lump	20.00-21.00

Ferroalloy Prices

Ferromanganese, 78-82%,
Carlots, duty paid, sbd. $120.00
Carlots, del. Pitts. 125.33
Carlots, f.o.b. Southern furn. 145.00
For ton lots add $10, for less-than-ton lots $13.50, for less than 200-lb. lots $18.

Spiegeleisen, 19-21% dom.
Palmerton, Pa., spot 36.00

Ferrosilicon, 50%, freight allowed, c.l. 74.50
Do., ton lot 87.00
Do., 75 per cent 135.00
Do., ton lots 151.00
Spot, $5 a ton higher.

Silicomanganese, c.l., 2½ per cent carbon 118.00
1½% carbon 128.00
Contract ton price $12.50 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 1.90-2.00

Ferrovanadium, 35 to 40%, lb., cont. 2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electric furn., per ton, c. l., 23-26% f.o.b. Mt. Pleasant, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 11.00c
Do., ton lots 11.75c
Do., less-ton lots 12.00c
less than 200 lb. lots 12.25c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	17.50c	18.25c	18.75c
1% carb.	18.50c	19.25c	19.75c
0.10% carb.	20.50c	21.25c	21.75c
0.20% carb.	19.50c	20.25c	20.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Molybdenum Oxide, lb. Molyb. cont., 5-20-lb. containers, f. o. b., Washington, Pa., lb. 0.80

Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots $1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb. 1.35
Do., less-ton lots 1.40
Spot 5c higher

Ferrocolumbium, 50-60% contract, lb. con. col., f.o.b. Niagara Falls $2.25
Do., less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton $142.50
Do., spot 145.00
Do., contract, ton lots 145.00
Do., spot, ton lots 150.00

15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50
Do., spot 160.00
Do., contract, ton lots 160.00
Do., spot, ton lots 165.00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do., ton lots 8.00c
Do., less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, freight allowed, lb. carlots, bulk 7.00c
Do., ton lots 7.50c
Do., less-ton lots 7.75c
Do., less 200 lbs. 8.00c
Spot ¼c lb. higher

Tungsten Metal Powder, 98-99 per cent, per lb., depending upon quantity $2.50-2.60

Vanadium Pentoxide, contract, lb. contained $1.10
Do., spot 1.15

Chromium Metal, 98% cr., contract, lb. con. chrome, ton lots 80.00c
Do., spot 85.00c
88% chrome, cont. tons 79.00c
Do., spot 84.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ⅛-in., lb. 14.50c
Do., 2% 13.00c
Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton $74.50
Ton lots 84.50
Less-ton lots, lb. 4.00c
Less 200 lb. lots, lb. 4.25c
Spot ¼-cent higher

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.50c
Ton lots 6.00c
Less-ton lots 6.25c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton 102.50
Do., ton 108.00

35-40%, contract, carloads, lb., alloy 14.00c
Do., ton lots 15.00c
Do., less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60
Do., 100-200 lb. lots 2.75
Do., under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Struc-tural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: S.A.E. 2300	Cold Drawn Bars: S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.48	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	5.26	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.05	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	5.50	.	4.42	....	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.00	4.92	3.47	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.30	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.85	5.25	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.18	4.23	4.73	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.80	3.75	....	4.50	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.49	4.49	6.09	4.19	....	5.79	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	3.75	5.95	5.95	4.10	4.10	5.50	4.20	..	5.25	....	6.90	....	....
Seattle	4.00	4.00	5.20	4.75	4.75	6.50	4.75	7.25	6.00	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	5.00	....	5.75	....	....
Los Angeles	4.15	5.45	7.25	4.95	4.95	7.20	5.10	7.30	6.30	....	6.60	11.35	10.35
San Francisco	4.00	5.20	6.80	4.70	4.70	6.40	4.70	7.20	6.45	....	7.05	11.60	10.60

	S.A.E. Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	6.65	....	8.75	8.60	9.40
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	9.05
San Francisco	6.05	10.60	9.60	9.45	10.10

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300 pounds and over, Portland, Seattle; 400-14,999 Twin Cities; 400-3999 Birmingham; 400 pounds and over in Memphis; Los Angeles, bars over 4-in. wide, 1-in. thick, 4.95c.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 1 to 1499 in Los Angeles; 300 and over in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; any quantity in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

EUROPEAN IRON, STEEL PRICES

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b U.K. Ports	£	s	d
Merchant bars, 3-inch and over	£66.50	16	10	0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20	0	0
Structural shapes	2.79c	15	10	0
Ship plates	2.90c	16	2	6
Boiler plates	3.17c	17	12	6
Sheets, black, 24 gage	4.00c	22	5	0
Sheets, galvanized, corrugated, 24 gage	4.61c	25	12	6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.20	1	10	9

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

		£	s	d
Foundry No. 3 Pig Iron, Silicon 2.50—3.00	$25.79	6	8	0(a)
Basic pig iron	24.28	6	0	6(a)
Furnace coke, f.o.t. ovens	7.15	1	15	6
Billets, basic soft, 100-ton lots and over	49.37	12	5	0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c	14	10	6
Merchant bars, rounds and squares, under 3-inch	3.17c	17	12	0††
Shapes	2.77c	15	8	0††
Ship plates	2.91c	16	3	0††
Boiler plates	3.06c	17	0	6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22	15	0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26	2	6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	23	15	0
Bands and strips, hot-rolled	3.30c	18	7	0

(a) del. Middlesbrough 5s rebate to approved customers. ††Rebate 15s on certain conditions.

Ores

Lake Superior Iron Ore

Gross ton, 51½%

Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	10.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Chinese wolframite, net ton, duty pd.	$24.00-25.00
Brazil iron ore, 68-69%, ord.	7.50c
Low phos. (.02 max.)	8.00c

F.O.B. Rio Janeiro.

Scheelite, imp.	23.50-24.00
Chrome ore, Indian, 48% gross ton, cif.	$43.00-46.00

Manganese Ore

Including war risk but not duty, cents per unit cargo lots.

Caucasian, 50-52%	....
So. African, 48%	70.00-72.00
Brazilian, 46%	69.00-71.00
Chilean, 47%	65.00-70.00
Cuban, 50-51%, duty free	....

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

IRON AND STEEL SCRAP PRICES

Maximum Prices Announced June 18 by Office of Price Administration and Civilian Supply (Gross Tons)

	Pittsburgh, Weirton, Steubenville(a)	Youngstown, Canton, Sharon	Chicago	Bethlehem	*East. Pa.	Sparrows Pt.	Cleveland	Buffalo	South Ohio†
No. 1 heavy melting	$20.00	$20.00	$18.75	$18.25	$18.75	$18.75	$19.50	$19.25	$19.50
No. 1 hyd. comp. black sheets	20.00	20.00	18.75	18.25	18.75	18.75	19.50	19.25	19.50
No. 2 heavy melting	19.00	19.00	17.75	17.25	17.75	17.75	18.50	18.25	18.50
Dealer No. 1 bundles	19.00	19.00	17.75	17.25	17.75	17.75	18.50	18.25	18.50
Dealer No. 2 bundles	18.00	18.00	16.75	16.25	16.75	16.75	17.50	17.25	17.50
Mixed borings and turnings	15.25	15.25	14.00	13.50	14.00	14.00	14.75	14.50	14.75
Machine shop turnings	15.50	15.50	14.25	13.75	14.25	14.25	15.00	14.75	15.00
Shovel turnings	16.50	16.50	15.25	14.75	15.25	15.25	16.00	15.75	16.00
No. 1 busheling	19.50	19.50	18.25	17.75	18.25	18.25	19.00	18.75	19.00
No. 2 busheling	15.50	15.50	14.25	13.75	14.25	14.25	15.00	14.75	15.00
Cast iron borings	15.75	15.75	14.50	14.00	14.50	14.50	15.25	15.00	.....
Uncut structurals and plate	19.00	19.00	17.75	17.25	17.75	17.75	18.50	18.25	18.50
No. 1 cupola	21.00	21.00	20.00	22.50	23.00	22.00	22.00	20.00	21.00
Heavy breakable cast	19.50	19.50	18.50	21.00	21.50	21.00	20.50	18.50	19.50
Stove plate	19.00	.....	17.00	18.00	18.50	18.00	18.00	19.00	17.50
Low phos. billet, bloom crops	25.00	25.00	23.75	23.25	23.75	23.75	24.50	24.25	23.50
Low phos. bar crops and smaller	23.00	23.00	21.75	21.25	21.75	21.75	22.50	22.25	21.50
Low phos. punch., plate scrap	23.00	23.00	21.75	21.25	21.75	21.75	22.50	22.25	21.50
Machinery cast cupola size	22.00	22.00	21.00	23.50	24.00	23.50	23.00	21.00	22.00
No. 1 machine cast, drop broken, 150 pounds and under	22.50	22.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50
Clean auto cast	22.50	22.50	21.50	24.00	24.50	24.00	23.50	21.50	22.50
Punchings and plate scrap‡‡	22.00	22.00	20.75	20.25	20.75	20.75	21.50	21.25	20.50
Punchings and plate scrap§§	21.00	21.00	19.75	19.25	19.75	19.75	20.50	20.25	19.50
Heavy axle and forge turnings	19.50	19.50	18.25	17.75	18.25	18.25	19.00	18.75	18.00
Medium heavy elec. furnace turnings	18.00	18.00	16.75	16.25	16.75	16.75	17.50	17.25	16.50

	St. Louis	Toledo, O.	Detroit	Duluth	Birmingham	Chattanooga	Radford, Va.	New England‡	Pacific Coast§
No. 1 heavy melting	$17.50	$.....	$17.85	$18.00	$17.00	$.....	$.....	$16.50	$14.50
No. 1 hyd. comp. black sheets	17.50	.....	17.85	18.00	17.00	.....	.....	.....	14.50
No. 2 heavy melting	16.50	.....	16.85	17.00	16.00	.....	.....	.....	13.50
Dealer No. 1 bundles	16.50	.....	16.85	17.00	16.00	.....	.....	.....	13.50
Dealer No. 2 bundles	15.50	.....	15.85	16.00	15.00	.....	.....	.....	12.50
Mixed borings and turnings	12.75	.....	13.10	.....	12.25	.....	.....	.....	9.75
Machine shop turnings	13.00	.....	13.35	15.50	15.00	.....	.....	.....	10.00
Shoveling turnings	14.00	.....	14.35	16.50	.....	.....	.....	.....	11.00
No. 1 busheling	17.00	.....	17.35	17.50	16.50	.....	.....	.....	14.00
No. 2 busheling	13.00	.....	13.35	13.50	12.50	.....	.....	.....	10.00
Cast iron borings	13.25	.....	13.60	13.75	12.75	.....	.....	.....	10.25
Uncut structurals and plate	18.50	.....	16.85	17.00	16.00	.....	.....	.....	13.50
No. 1 cupola	20.00	.....	20.35	18.00	20.00	20.50	21.00	22.00	18.00
Heavy breakable cast	18.50	.....	18.85	16.50	18.50	.....	.....	20.50	17.00
Stove plate	17.00	15.60	14.10	.....	17.00	17.50	18.00	14.00	14.00
Low phos. billet and bloom crops	22.50	.....	22.85	23.00	22.00	.....	.....	.....	.....
Low phos. bar crops and smaller	20.50	.....	20.85	21.00	20.00	.....	.....	.....	.....
Low phos. punch. and plate scrap**	20.50	.....	20.85	21.00	20.00	.....	.....	.....	.....
Machinery cast cupola size††	21.00	.....	21.35	19.00	21.00	21.50	22.00	23.00	19.00
No. 1 machine cast, drop broken, 150 pounds and under	21.50	.....	21.85	19.50	21.50	22.00	22.50	23.50	19.50
Clean auto cast	21.50	.....	21.85	19.50	21.50	22.00	22.50	23.50	19.50
Punchings and plate scrap‡‡	19.50	.....	19.85	20.00	19.00	.....	.....	.....	.....
Punchings and plate scrap§§	18.50	.....	18.85	19.00	18.00	.....	.....	.....	.....
Heavy axle and forge turnings	17.00	.....	17.35	17.50	16.50	.....	.....	.....	14.00
Medium heavy elec. furnace turnings	15.50	.....	15.85	16.00	15.00	.....	.....	.....	12.50

*Claymont, Del., Coatesville, Phoenixville, Harrisburg, Pa. †Portsmouth, Middletown, O., Ashland, Ky. ‡Worcester, Mass.; Bridgeport, Conn.; Phillipsdale, R. I. §Los Angeles, San Francisco, Seattle; **⅝-inch and heavier, cut 12 inches and under; ††may include clean agricultural cast; ‡‡under ⅜-inch to ¼-inch, cut 12 inches and under; §§under ¼-inch to No. 12 gage, cut 12 inches and under.

Maximum Prices for Iron and Steel Scrap Originating from Railroads

	Pittsburgh, Wheeling, Steubenville	Youngstown, Canton, Sharon	Chicago	Kokomo, Ind.	*East. Pa.	Sparrows Pt.	Cleveland	Buffalo	South Ohio†
No. 1 Railroad grade heavy melting steel	$21.00	$21.00	$19.75	$19.25	$19.75	$19.75	$20.50	$20.25	$20.50
Scrap rails	22.00	22.00	20.75	20.25	20.75	20.75	21.50	21.25	21.50
Rerolling quality rails	23.50	23.50	22.25	21.75	22.25	22.25	23.00	22.75	23.00
Scrap rails 3 feet and under	24.00	24.00	22.75	22.25	22.75	22.75	23.50	23.25	23.50
Scrap rails 2 feet and under	24.25	24.25	23.00	22.50	23.00	23.00	23.75	23.50	23.75
Scrap rails 18 inches and under	24.50	24.50	23.25	22.75	23.25	23.25	24.00	23.75	24.00

	St. Louis	Kansas City	Detroit	Duluth	Birmingham	Minnequa, Colo.	Radford, Va.	New England‡	Pacific Coast§
No. 1 Railroad grade heavy melting steel	$18.50	$17.00	$18.85	$19.00	$18.00	$17.50	$.....	$.....	$15.50
Scrap rails	19.50	18.00	19.85	20.00	19.00	18.50	.....	.....	16.50
Rerolling quality rails (a)	21.00	19.50	21.35	21.50	20.50	20.00	.....	.....	18.00
Scrap rails 3 feet and under	21.50	20.00	21.85	22.00	21.00	20.50	.....	.....	18.50
Scrap rails 2 feet and under	21.75	20.25	22.10	22.25	21.25	20.75	.....	.....	18.75
Scrap rails 18 inches and under	22.00	20.50	22.35	22.50	21.50	21.00	.....	.....	19.00

*Philadelphia, Wilmington, Del., Claymont, Del., Coatesville, Phoenixville, Harrisburg, Pa.; †Portsmouth, Middletown, O., Ashland, Ky. ‡Worcester, Mass.; Bridgeport, Conn.; Phillipsdale, R. I. §Los Angeles, San Francisco, Seattle. (a) also Johnstown, Pa., Warren, O.

NOTE: Where the railroad maker of scrap operates in two or more of the consuming points named above, the highest of the maximum prices set out above for such basing points shall be the maximum price at consumer's plant at any point on the railroad's line, except that switching charges of 84 cents per gross ton shall be subtracted from the maximum price of scrap originating from railroads operating in Chicago and sold for consumption outside Chicago. (a) Re-laying quality $5 higher.

Sheets, Strip

Sheet & Strip Prices, Pages 100, 101

Sheet consumers without preference rating have increasing difficulty, not only in getting delivery promises, but in getting orders on mill books. This is especially true of galvanized sheets and a high rating is necessary to obtain early delivery. Some sheet sellers are out of the market for fourth quarter but in some cases are giving definite promises for that delivery for non-defense work. However, these contracts are subject to provisos.

One important sheet and strip maker has announced lengthened deliveries as follows: Narrow strip, 2½ inches and under, from 5 to 6 months, to 6 to 7; wide strip, 2½ to 8 inches, from 9 to 10 months, to 10 to 11; strip mill size sheets from 9 to 10 months, to 10 to 11 months; and galvanized, hot and cold-rolled sheets are listed as fourth quarter, 1942.

Automobile manufacturers are near the close of 1941 model production and will start soon on 1942 programs. A midwestern sheet mill July 1 curtailed sheet and strip shipments to motor manufacturers 20 per cent and will scale down from that. Such slack as this produces will be taken up at once by enlarged defense requirements. Volume of orders continues to slacken as consumers find it difficult to place tonnage for reasonable delivery.

In the Cincinnati district the effort to provide non-defense users on the basis of 1940 consumption is meeting difficulty and apportionments are being reduced steadily. In that area producers have taken no fourth quarter tonnage.

As priorities have gone into effect on chromium metal sheet sellers expect similar action on chrome-bearing sheets within a fortnight. This was the procedure in the case of nickel-bearing sheets. Straight chrome sheets are heat resistant and largely used by oil burner manufacturers and makers of restaurant equipment, who had turned from nickel to chrome and again will be crowded.

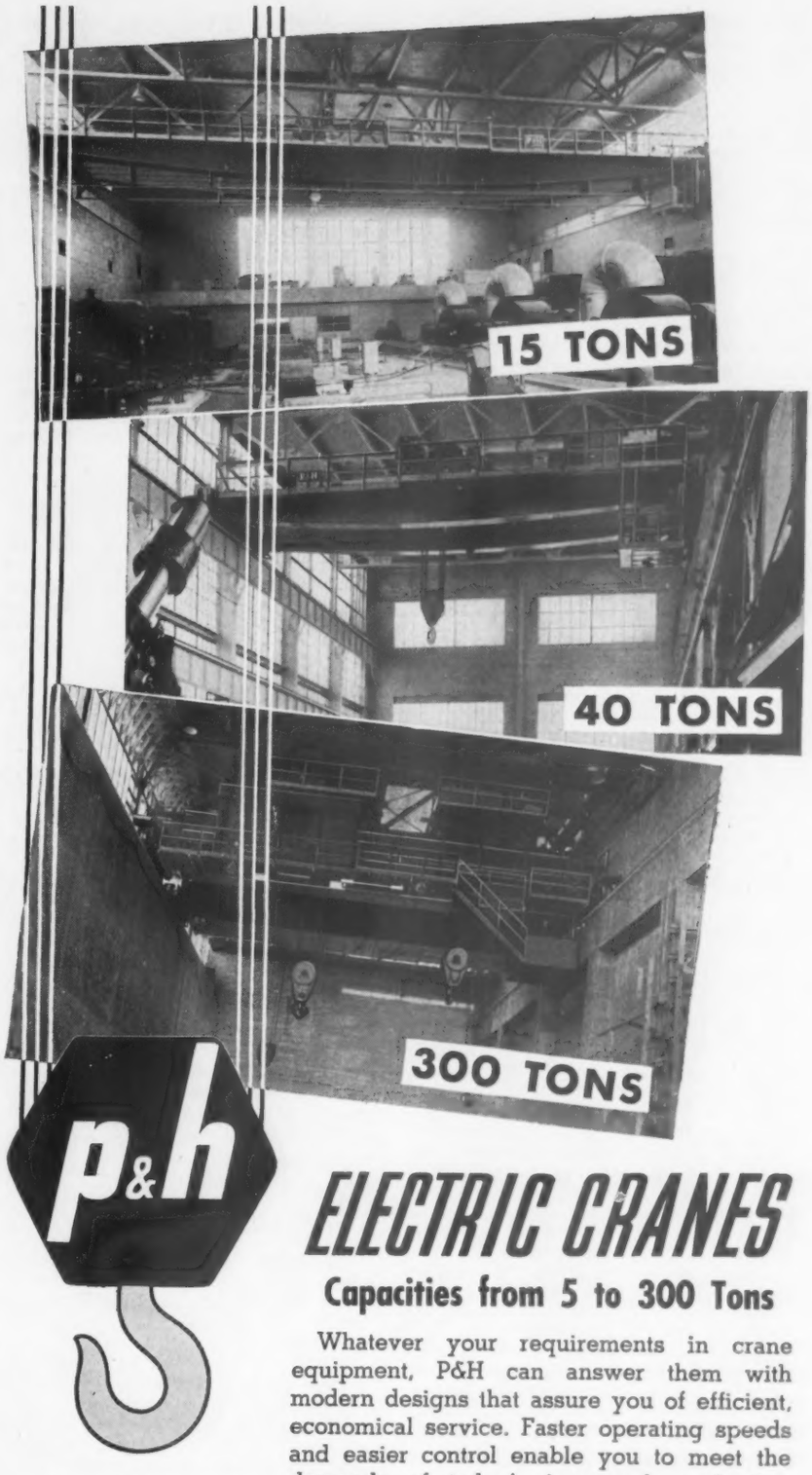
Jobbers and stovemakers, without priorities, except on some special projects, are clamoring for sheets, with deliveries far short of demands as their suppliers find defense needs increasingly insistent.

Plates

Plate Prices, Page 100

Plates present one of the most difficult delivery problems in the steel industry and its solution seems remote. In the case of many important mills orders for the remainder of the year all carry top priority and scheduling one order simply means crowding back another of equal rating.

Some relief is being afforded by lighter plates being taken off plate mills and rolled on sheet mills but tonnages of plates over 1-inch show no signs of diminishing. Plate deliveries have been holding up well to the present, because other mate-



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rial needed in ship and tank construction, which takes most of the plate shipments, were further delayed than plates. The latter have been catching up and plates now are in heavier demand for immediate shipment. Additional plate capacity will be coming in later in the year to relieve this situation somewhat. Secondary priorities have been pushed back until they are practically meaningless in the case of most mills. Power jobs are among the sufferers in this respect.

Additional contracts for construction of 500-ton steel lighters, requiring a total of approximately 7000 tons of plates have been awarded to Dravo Corp., Pittsburgh, to fabricate a group of covered lighters for delivery at Brooklyn for the navy. Awards have also been made to Dekom Shipbuilding Corp., Brooklyn; additional units to J. K. Welding Co., Brooklyn, and Pacific Car & Foundry Co., Seattle. Nelson Boiler & Tank Co. has also been awarded contracts for covered lighters and the Dravo Corp. for self-dumping scows.

PLATE CONTRACTS PLACED

270 tons, also 180 tons shapes, three additional 250-ton closed navy lighters, to Pacific Car & Foundry Co., Seattle.

225 tons, 500,000-gallon elevated steel water tank, Fort Logan, Denver, Colo., to Pittsburgh-Des Moines Steel Co., Des Moines, Iowa, $52,140 with alternate of $53,775; bids June 28, U. S. engineer, Omaha, Nebr.; bid on reinforcing steel, fabricated and in place, $120 per ton.

200 tons, elevated steel water tank, flying cadet reception center, Kelly Field, Tex., to Chicago Bridge & Iron Co., Houston, Tex., $51,540, bids June 18, U. S. engineer, Galveston, Tex., inv. 412.

100 tons, elevated steel tank, Fort Sheridan, Ill., to Chicago Bridge & Iron Co., Chicago, $38,150, bids June 17.

100 tons, 250,000-gallon elevated steel tank, Fort Monroe, Va., to Chicago Bridge & Iron Co., Chicago, $39,850.

Unstated, storage and gas fueling system Sunset air field, Spokane, Wash., to Aqua Systems, New York, low at $138,051, by U. S. engineer, Seattle.

Unstated, also unstated shapes, covered naval lighters, to Nelson Boiler & Tank Co., Seattle, award at $92,962.

Unstated, 9461 feet 52 in. coal tar enamel steel pipe, alternate for lock joint concrete, and fittings; bids to Tacoma July 21; $240,000 available.

Unstated tonnage, thirty-two 250-barrel steel storage tanks, quartermaster, Marine Corps., Washington, to Columbia Steel Tank Co., Kansas City, Mo.; sch. 1455, bids June 16.

PLATE CONTRACTS PENDING

164 tons, fabricated high-strength, low-alloy plates and structural steel cap plates, Panama, sch. 5208, U. S. Steel Export Co., Washington, low, $21,970.63, bids June 26, Washington.

100 tons or more, 1221 feet, 80-inch steel pipe, south filtered water Reservoir, McMillan filtration plant, Washington; bids July 17, serial 230, to U. S. engineer office, Washington; alternate on 78-inch concrete pipe.

Wire

Wire Prices, Page 101

Difficulty in meeting demand for wire and wire products arises mainly from shortage of wire rods, especially in the case of non-integrated producers dependent on others for raw materials. Steel ordinarily being rolled into wire rods has been diverted to other outlets.

Some decrease in automotive demand accompanies change of models but this is temporary. Jobber stocks have been reduced but in most instances are sufficient to meet demands of small buyers.

Bars

Bar Prices, Page 100

Demand for steel bars, both carbon and alloy, for defense work, is increasingly heavy and deliveries to commercial consumers are falling further behind. Warehousemen have great difficulty in obtaining replacements. Deliveries on carbon bars have advanced from a range of ten to 12 months to about 15 months and popular sizes of alloy bars which have been available in six or eight months are now the subject of inquiry as to delivery.

Two shell inquiries, aggregating 16,000 tons are being figured in the East, presenting an added burden to already loaded mills. Some warehouses in the East had a decline in tonnage moved in June, due to shrinkage of stocks, but this was not so generally true in point of dollar value, as movement of special steels was heavier, carrying higher prices.

The priority situation in bars, as well as in other steel products, has reached a point of confusion and sellers are swamped with priorities and special certificates where broader ratings fail. As a result mill schedules are being constantly disturbed. Priorities are so numerous that they have begun to nullify themselves in many instances. Yet the average consumer has little chance to obtain steel without some preference rating.

Pipe

Pipe Prices, Page 101

Pressing into service of idle tank cars has relieved pressure somewhat on building of pipe lines and more oil barges have been used for transporting oil.

Award is about to be made on a double oil line, 900 miles long, from New Orleans to a New Jersey port, taking about 800,000 tons of steel. Original plans called for a single line, 24 inches in diameter. However, because of the few companies which can make such large pipe in quantities, plans were revised to provide for a double line, each 12¾ inches.

Southern pipe foundries are heavily booked and are producing close to capacity, though the rate could be increased somewhat if larger pig iron supply were available.

A maker of merchant pipe has devised an elaborate system of rationing, depending on past consumption and distance from source of supply. The nearest consumer is allowed two months supply and the farthest, six months.

CAST PIPE PLACED

325 tons, improvement of Sand Point Way, Seattle, to United States Pipe & Foundry Co., Burlington, N. J.

105 tons, 2 to 6-inch, Loyalton, Calif., to Pacific States Cast Iron Pipe Co., Provo, Utah.

CAST PIPE PENDING

400 to 500 tons, 36-inch, San Diego, Calif.; bids July 8.

Unstated, 6 and 8-inch, for Pasco, Wash.; bids to Adah Perry, clerk, July 17.

Rails, Cars

Track Material Prices, Page 101

Award of 32,749 freight cars in June was the highest total for any month in recent years and exceeded the annual total in several depression years, and doubled the total for 1938. More than 40 per cent of June orders were placed with railroad companies' own shops.

Awards for six months totaled 94,775, compared with 16,173 in the corresponding period last year. Other comparisons follow:

	1941	1940	1939	1938
Jan.....	15,169	360	3	25
Feb.....	5.508	1,147	2,259	109
March...	8,074	3,104	800	680
April....	14,645	2,077	3,095	15
May.....	18,630	2,010	2,051	6,014
June	32,749	7,475	1,324	1,178
6 mos....	94,775	16,173	9,532	8,121
July.....	.....	5,846	110	0
Aug.	.....	7,525	2,814	182
Sept.	.....	9,735	23,000	1,750
Oct.....	.....	12,195	19,634	2,537
Nov.	.....	8,234	2,650	1,232
Dec.....	.....	7,181	35	2,581
Total ..	.....	66,889	57,775	16,303

Producers are giving particular attention on 160,000 tons of plates, shapes, sheets and bars for freight car construction, with an allocation likely to be announced shortly by OPM.

Carbuilders estimate that this tonnage would meet about one month's requirements, based on needs of 80,000 cars, which they would like to complete this year, and including a few thousand which the railroads themselves would like to get out in their own shops. However, some trade interests doubt if sufficient steel will be available for the construction of even 50,000 cars.

Such a program, it is pointed out, would also take a heavy tonnage of wheels, axles and specialties, in addition to rolled products, thus further complicating the problem. Incidentally, car builders assert they have considerable difficulty in getting pig iron to meet their maintenance requirements for wheels.

Meanwhile, in addition to new equipment, repair programs are being expanded sharply, with the New York Central having just entered the market for 50,000 tons of rolled steel for repairs to 9000 freight cars.

While the railroad equipment builders now have a priority rating of A-3, it is falling far short of providing the relief desired. Hence, the probability of a special allocation

to meet pressing needs. There has been a slight improvement recently, with three car shops down instead of six a fortnight or so ago, but several are proceeding on curtailed schedules.

Car builders claim they have more difficulty obtaining steel in the Pittsburgh area than in the Chicago, St. Louis or Birmingham districts.

CAR ORDERS PLACED

Delaware, Lackawanna & Western, 600 box cars and 250 gondolas to American Car & Foundry Co., New York; 400 box cars to Magor Car Corp., Passaic, N. J.

Seaboard Air Line, 100 70-ton hopper cars, to Bethlehem Steel Co., Bethlehem, Pa.; in addition to 650 noted in a recent issue as having been distributed.

LOCOMOTIVES PLACED

Army, two 70-ton diesel-electric switch engines for Jefferson proving ground, Madison, Ind., to Vulcan Iron Works, Wilkesbarre, Pa.

Navy, two diesel-electric switch engines, to Vulcan Iron Works, Wilkesbarre, Pa.

Seaboard Air Line, 13 diesel-electric locomotives, three 5400-horsepower freight locomotives, two 2000-horsepower passenger locomotives and two 1000-horsepower switch engines to Electro-Motive Corp., La Grange, Ill.; three 1000-horsepower switch engines to Baldwin Locomotive Works, Eddystone, Pa.; and three 1000-horsepower switch engines to American Locomotive Co., New York.

Structural Shapes

Structural Shape Prices, Page 100

A marked falling off in current inquiry and awards is noted, due in part to the holiday, in part to difficulty of getting reasonable delivery and in part to patriotic realization that non-defense must give way to defense. There is belief, however, that once major defense construction is out of the way much potential civilian work will be revived. However lack of plain steel may hinder. Morever, many structural mills will be rolling rails and special shapes for ship and tank construction. These will require more mill time per ton than standard shapes, with tonnage output thus smaller.

Prominent inquiries in the Middle West are for telephone exchange buildings, power plants and other forms of public service which must be expanded because of greater concentrations of population in defense areas.

One of the larger newer projects is a 6000-foot vehicular tunnel under the Delaware river, for which President Roosevelt has just given official approval.

SHAPE CONTRACTS PLACED

1100 tons, additional 37 MM line, Kingsbury ordnance, La Porte, Ind., to American Bridge Co., Pittsburgh.

1000 tons, shop and office building, King Machine Tool Co., Cincinnati, to Indiana Bridge Co., Muncie, Ind.; Ferro Concrete Construction Co., Cincinnati, contractor; Pollak Steel Co., Cincinnati, awarded 60 tons reinforcing bars.

900 tons, addition, Kansas Power & Light Co., Kansas City, Kans., to Kansas City Structural Steel Co., Kansas City, Kans.

725 tons, two storehouses, Frankford arsenal, Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa., through Highes-Foulkrod, Philadelphia.

701 tons, bridge work, Texas state highway department, Dallas county; also 312 tons reinforcing bars, with bridge railing and bearing piles, to North Texas Iron & Steel Co., Fort Worth, Tex.

700 tons, five warehouse units, Brookley Field, Mobile, Ala., U. S. engineer to International Steel Co., Evansville, Ind.; Algernon Blair, Montgomery, Ala., contractor.

695 tons, ventilation building, New York side, north tube, Lincoln tunnel, New York, to American Bridge Co., Pittsburgh, through Thompson-Starrett Co., New York, contractor.

645 tons, angles, partial requirements, Wright Field, O., under cir. 2178, to Carnegie-Illinois Steel Corp., Pittsburgh, only bidder; remainder being purchased in open market.

510 tons, hangar No. 2, LaGuardia field, New York, to Harris Structural Steel Co., New York, through Jonwal Construction Co., New York.

500 tons, clothing renovation plant, quartermaster depot, Kansas City, Mo., to Carnegie-Illinois Steel Corp., Pittsburgh, through Universal Construction Co., Kansas City.

466 tons, mill building, Continental Steel Corp., Kokomo, Ind., to Wisconsin

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Bridge & Iron Co., Milwaukee.

465 tons, clothing renovation plant, Cumberland General Depot, Pa., to Anthracite Bridge Co., Scranton, Pa.; H. B. Alexander, Harrisburg, Pa., contractor.

425 tons, highway bridge, Dansville, N. Y., to American Bridge Co., Pittsburgh, Hornell Construction Co., Hornell, N. Y., contractor.

423 tons, six standard finished ammunition buildings, Kingsbury ordnance plant, Laporte, Ind., for government, to Mississippi Valley Structural Steel Co., Decatur, Ill.; Bates & Rogers Construction Corp., Laporte, Ind., contractor.

400 tons, power plant, Alexandria, Va., for Barstow Management, Reading, Pa., to Belmont Iron Works, Philadelphia.

367 tons, overpass, Norfolk county, Virginia, to Virginia Bridge Co., Roanoke, Va.; W. N. Jackson, Roanoke, contractor.

321 tons, state highway bridge, Plattsmouth, Nebr., to Omaha Steel Works, Omaha, Nebr.

275 tons, building No. 26, du Pont de Nemours Co. Inc., Niagara Falls, N. Y., to Bethlehem Steel Co., Buffalo.

260 tons, hangar and shop, Bolling field, Washington, to American Bridge Co., Pittsburgh.

250 tons, various small jobs, including 100 tons for plant addition, Pennsylvania Salt Co., Tacoma, to Pacific Car & Foundry Co., Seattle.

250 tons, ward, shop and miscellaneous buildings, marine barracks, Quantico, Va., to Fort Pitt Bridge Works, Pittsburgh, through Harwood-Nebel Construction Co., Washington.

245 tons, Bird street bridge, Boston, state project, to Phoenix Bridge Works, Phoenixville, Pa., through Coleman Bros. Corp., Boston.

236 tons, bridge, East Dubuque, Ill., for Illinois Central railroad, to American Bridge Co., Pittsburgh.

225 tons, state bridge, Northbridge, Mass., to Bethlehem Steel Co., Bethlehem, Pa., through Carlo Bianchi, Framingham, Mass.

220 tons, state highway bridge, Charleston, Miss., to Vincennes Steel Corp., Vincennes, Ind.

200 tons, sub-station, du Pont de Nemours Co. Inc., Niagara Falls, N. Y., to Ernst Iron Works, Buffalo.

200 tons, building, Acme Steel & Malleable Iron Works, Buffalo, to R. S. McMannus Steel Construction Co. Inc., Buffalo.

200 tons, highway bridge, Jefferson County, New York, to Bethlehem Steel Co., Buffalo; Bero Engineering Corporation, Buffalo, contractor.

165 tons, Eureka slough bridge, Eureka, Calif., for state, to American Bridge Co., Pittsburgh.

160 tons, bridge, Delaware & Hudson railroad, West Waterford, N. Y., to American Bridge Co., Pittsburgh.

158 tons, state bridges, route FA 155, section 1-XF, Haypress, Green county, Illinois, to Illinois Steel Bridge Co., Jacksonville, Ill.; bids June 13.

155 tons, preparation building, sponsored by Defense Plant Corp., Akron, O., to American Bridge Co., Pittsburgh.

150 tons, state bridge PSC-C-8141, Long Island railroad, Hempstead, N. Y., to American Bridge Co., Pittsburgh.

140 tons, state highway bridge, Peterboro, N. H., to American Bridge Co., Pittsburgh.

120 tons, crane runway, Chicago Bridge & Iron Co., Chicago, to American Bridge Co., Pittsburgh.

100 tons, bridge, Schenectady county, New York, to American Bridge Co., Pittsburgh, through Fitzgerald Construction Co., Troy, N. Y.

100 tons, additional facilities, naval air station, Miami, Fla., to Aetna Iron and Steel Co., Jacksonville, through Paul Smith Construction Co., Miami.

100 tons, building additions, Atlas Powder Co., Stamford, Conn., to J. G. Schmidt Iron Works, Passaic, N. J.; Samworth-Hughes Co., Paterson, N. J., contractor; Igoe Bros., Newark, awarded 65 tons reinforcing bars.

SHAPE CONTRACTS PENDING

16,000 tons, 30 and 50 buildings, St. Louis, for government.

8000 tons, Southwark power house, Philadelphia Electric Co., Philadelphia; bids early this week.

4000 tons, plant addition, General Electric Co., Lynn, Mass.

1000 tons, terminal market buildings, Brooklyn, N. Y.; bids July 18.

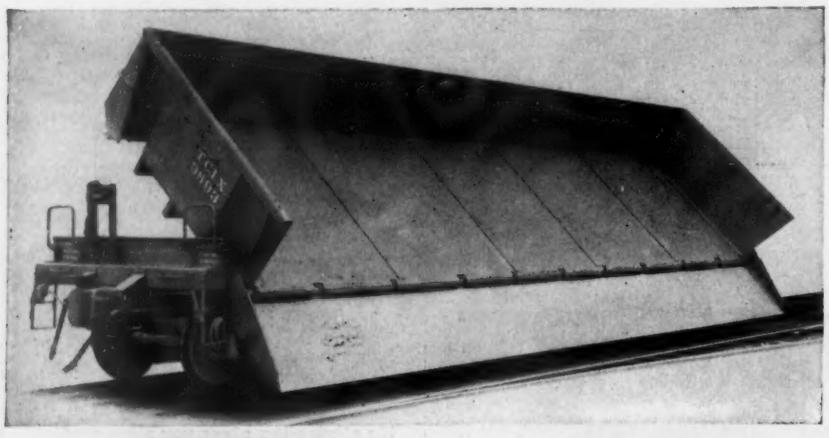
750 tons, landplane hangar, Anacostia, D. C., for navy.

700 tons, warehouse, Wichita, Kans., sponsored by Defense Plant Corp.,

SHAPE AWARDS COMPARED

	Tons
Week ended July 12	14,252
Week ended July 5	21,195
Week ended June 28	37,930
This week, 1940	18,795
Weekly average, 1941	30,130
Weekly average, 1940	28,414
Weekly average, June, 1941	27,157
Total to date, 1940	514,546
Total to date, 1941	873,759

Includes awards of 100 tons or more.



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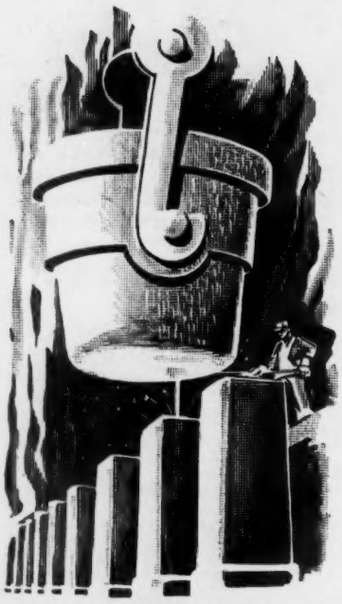

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Washington.

500 tons or more, 850 transmission towers, 183-mile power line Coulee-Puget Sound; H. H. Walker Co., Ltd., awarded 111-mile section, $523,259; 72-mile section to Fritz Ziebarth, Vancouver, Wash., $245,872; by Bonneville project.

400 tons, bridge, Mahoning river, Lowellville, O., for Mahoning county, Ohio.

380 tons, state highway bridges, Dauphin county, Pennsylvania; bids to state highway department, Harrisburg, Pa., July 18.

321 tons, grade crossing elimination, Totowa, N. J., Franklin Contracting Co., Newark, N. J. low; bids July 11, Trenton.

300 tons, quartermaster's warehouse, Seattle; Western Construction Co., Seattle, low.

300 tons, navy storehouses and magazines, Oyster Bay, Wash., depot; Hoard & Stingl, Seattle, contractors.

235 tons, Main street bridge, Becket, Mass.; Graves & Hemmes Inc., Great Barrington, Mass., low, $114,074.60.

225 tons, bridge, Bean's Crossing, Northbridge, Mass.; Carlo Bianchi, Framingham, Mass., low, $150,841.50.

200 tons, bridge, Fox river, Dayton, O., for LaSalle county, Ohio.

200 tons, building addition, Standard Milling Co., Buffalo.

200 tons, building No. 12, du Pont de Nemours Co. Inc., Niagara Falls, N. Y.

200 tons, building addition, Republic Carbon Co., Niagara Falls, N. Y.

187 tons, Dayton bridge, La Salle, Ill., for LaSalle county; William J. Howard Inc., Chicago, low.

175 tons, ROTC riding hall, Cornell university, Ithaca, N. Y.

170 tons, underpass, Woodbury, N. J.; one bidder July 11, bids returned unopened.

145 tons, state bridge, Skowhegan, Maine.

125 tons, pattern shop, Worthington Pump & Machinery Corporation, Buffalo.

120 tons, repairs bridge, Forty-third street, Chicago, for New York Central railroad.

115 tons, Payette division, Boise, Idaho, project; bids to Boise, July 28.

100 tons, building addition, Hewitt Rubber Corporation, Buffalo.

100 tons, angles, channels, I-beams and plates, purchasing officer, Bonneville Power Administration, Portland, Oreg., inv. 2057; bids July 18.

Unstated, Oregon state bridges, Clatsop and Lincoln counties; bids to Portland, July 17.

Unstated, steel towers, 230-kv. lines, No. 2069, to Bonneville project, Portland, July 11.

Ferroalloys

Ferroalloy Prices, Page 102

Due to drought in the south, which has affected power production, some sellers of ferroalloys have had to advise customers of a reduction in quotas this month. As a result, July movement for the industry as a whole will fall short of total June deliveries.

Chrome alloys are the latest to be placed on a priority basis, consumers now having to obtain certificates.

Prices continue unchanged, ferromanganese holding at $120, duty paid, Atlantic and gulf ports, and 19 to 21 per cent spiegeleisen at $36, Palmerton, Pa.

Reinforcing Bars

Reinforcing Bar Prices, Page 101

Several companies are virtually out of the market as steel is needed for what they consider more important uses. However awards were numerous the past week, or well over 15,000 tons. Chicago notes awards are heavier at the moment, with tonnages from 1000 tons downward. Mills and jobbers are more than ever confining attention to defense construction. Illustrating quiet conditions, largest award in the Philadelphia consuming district the past week involved only 300 tons for barracks for the navy yard.

REINFORCING STEEL AWARDS

1500 tons, rebuilding and enlarging dock ordnance depot, Charleston, S. C., to Bethlehem Steel Co., Bethlehem, Pa., through Espy Paving and Construction Co., Savannah, Ga.

1235 tons, paving, Detroit, Wayne county road commission, to Truscon Steel Co., Youngstown, O.

1200 tons, pier, Benicia Arsenal, Benicia, Calif., to Soule Steel Co., San Francisco.

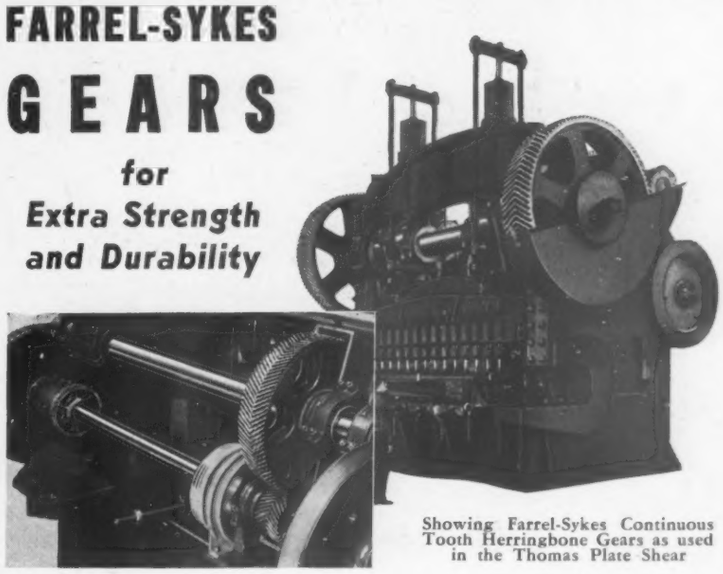
1000 tons, drydock addition, navy yard, Portsmouth, N. H., to Jones & Laughlin Steel Corp., Pittsburgh; Aberthaw Co.,

World's Largest Plate Shear Uses

FARREL-SYKES

GEARS

for Extra Strength and Durability



Showing Farrel-Sykes Continuous Tooth Herringbone Gears as used in the Thomas Plate Shear

In this giant plate shear, which will cut steel plates up to 2½" thick by 13'6" wide, gears possessing maximum strength and load-carrying capacity had to be used. To secure these qualities, the builder, Thomas Machine Manufacturing Company, equipped this plate shear with Farrel - Sykes Herringbone Gears.

These continuous tooth herringbone gears have a larger number of teeth in contact, which gives them additional strength and ability to carry heavier loads and to withstand shocks, stresses and wear. Wear is retarded by the interlacing of the teeth, creeping engagement and inclined line of pressure. Due to these characteristics, involute profile and correct tooth action are retained as long as the gears last.

The opposed helices of Farrel-Sykes Herringbone Gears balance and absorb axial thrust within the gear member, preventing harmful thrust loads and resultant stresses on other parts of the machinery. Precision generated by the Sykes process, these gears are notably quiet and smooth-running.

Farrel-Sykes Gears are built for every type of service and special units are designed to order. Farrel engineers welcome the opportunity to consult with you on your gear problems.

FARREL SYKES GEARS

FARREL-BIRMINGHAM COMPANY, INC.

322 VULCAN STREET BUFFALO, N. Y.

The Gear with a Backbone

contractor.

1000 tons, brass rolling mill, Revere Copper & Brass Inc., Chicago, to Joseph T. Ryerson & Son Inc., Chicago; James Stewart Corp., Chicago, contractor.

750 tons, army base, warehouses and bridges, San Juan, Puerto Rico, to Truscon Steel Co., Youngstown, O.; Paul Smith Construction Co., contractor.

700 tons, two shipways, New York Shipbuilding Co., Camden, N. J., to Truscon Steel Co., Youngstown, O.; Leonard Shaffer, contractor.

600 tons, five warehouse units, Brookley Field, Mobile, Ala., U. S. engineer to Virginia Steel Co., Birmingham; Algernon Blair, Montgomery, Ala., contractor.

515 tons, garage and offices, Coca Cola Co., Chicago, to Bethlehem Steel Co., Bethlehem, Pa.; Paschen Bros. Construction Co., Chicago, contractor.

500 tons, buildings, Veteran's hospital, Fort Howard, Baltimore, to Bethlehem Steel Co., Bethlehem, Pa., through Aufder-Heide-Aragona, contractor.

450 tons, 14 inert material warehouses, proving ground, Savanna, Ill., for government, to Ceco Steel Products Corp., Chicago; Manhattan Construction Co., Okmulgee, Okla., contractor; bids June 20.

425 tons, administration building, quartermaster depot, Jeffersonville, Ind., to American Building Supply Co., Louisville, Ky., through George H. Rommel Co., Louisville, Ky.

410 tons, defense housing, navy yard, Brooklyn, N. Y., to Fireproof Products Co.

360 tons, naval base station facilities, Lakehurst, N. J., to Bethlehem Steel Co., Bethlehem, Pa., through Karno Smith & Co. and Duffy Construction Co., contractor.

350 tons, jail, Fresno, Calif., to Kyle & Co., Fresno, Calif.

350 tons, viaduct, two bridges and approaches, Hartford county, Connecticut, to Joseph T. Ryerson & Son Inc., Chicago; DeFelice & Son, contractors.

320 tons, paving, Chicasaw county, Iowa, to Sheffield Steel Corp., Kansas City, Mo.

300 tons, barracks, Philadelphia navy yard, to Taylor-Davis Co.

260 tons, field service building and armory, Springfield, Mass., to Truscon Steel Co., Youngstown, O., through Casper-Ranger Construction Co., Holyoke, Mass.

250 tons, addition, American Brass Co., Kenosha, Wis., to Truscon Steel Co., Youngstown, O.; through Austin Co., contractor.

250 tons, inert storage units, Western Cartridge Co., Weldon Springs, Mo., to Ceco Steel Products Corp., Chicago; Fraser Brace Engineering Co., contractor; bids June 19.

240 tons, government storehouse, Springfield, Mass., to Truscon Steel Co., Youngstown, O., Caspar Ranger Construction Co., contractor.

200 tons, telephone building addition, Providence, R. I., to Truscon Steel Co., Youngstown, O., through E. Turgeon Co., Providence, contractor.

178 tons, radio building, station WTMJ, Milwaukee, to W. H. Pipkorn Co., Milwaukee; Dahlman Construction Co., Milwaukee, contractor.

176 tons, state highway bridge, FAGH-419H, Bellevue, Jackson county, Iowa, to Sheffield Steel Corp., Kansas City, Mo.; Jensen Construction Co., contractor.

175 tons, Bird street bridge, Boston, to Northern Steel Co., through Coleman Bros. Corp., Boston.

160 tons, building, Distler Color Co., Detroit, to Jones & Laughlin Steel Corp., Pittsburgh; Taylor-Gaskin, contractor.

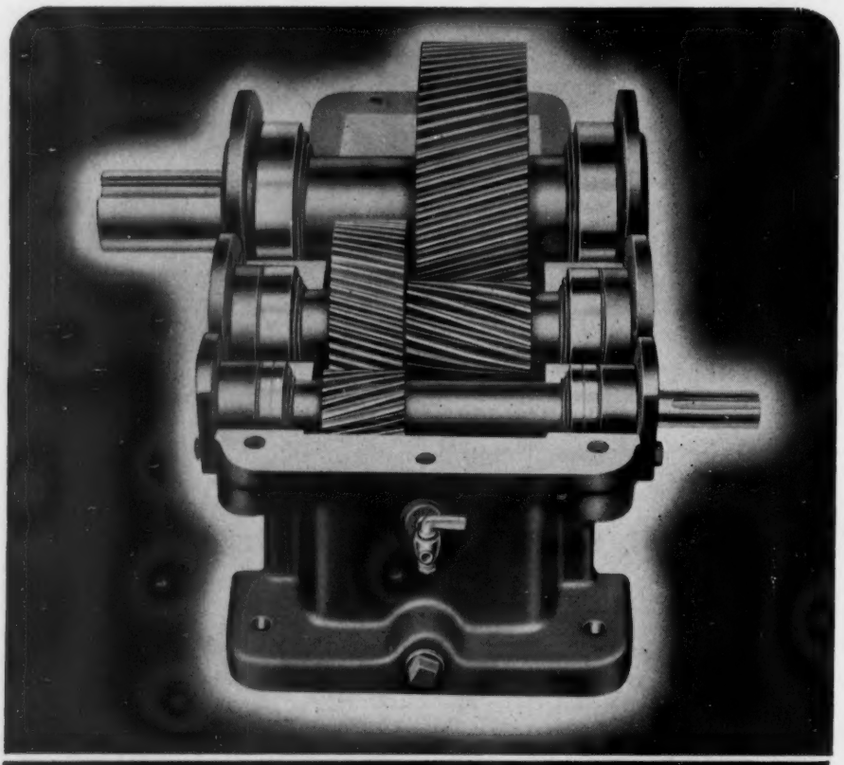
155 tons, bridge, St. Johnsbury, Vt., to Truscon Steel Co., Youngstown, O., through Charles I. Hosmer Inc., Greenfield, Mass., contractor.

150 tons, two buildings, navy yard, Boston, to Concrete Steel Co., through Sawyer Construction Co., Boston.

150 tons, clothing renovation plant, Cumberland General Depot, Pa., to Truscon Steel Co., Youngstown, O.; H. B. Alexander, Harrisburg, Pa., contractor.

145 tons, state highway bridge 1452, Norton, W. Va., to Ben Tom Supply Co.; through Dodd & Archer, contractor.

130 tons, state highway project FAP-



MONEY-SAVING HELICAL REDUCERS

★ It's a two-way saving . . . in manufacturing because of the simplicity of design by Horsburgh & Scott engineers and . . . in maintenance and freedom from breakdowns because of the rugged and precision construction of every part from the finest materials. Investigate these H. & S. Helical Reducers with their lower first cost and longer trouble-free life.

Send note on Company Letterhead for Speed Reducer Catalog 39

THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

5112 HAMILTON AVENUE • CLEVELAND, OHIO, U. S. A.

CONCRETE BARS COMPARED

	Tons
Week ended July 12	15,360
Week ended July 5	5,437
Week ended June 28	8,861
This week, 1940	8,585
Weekly average, 1941	11,192
Weekly average, 1940	9,661
Weekly average, June, 1941	11,277
Total to date, 1940	228,747
Total to date, 1941	324,577

Includes awards of 100 tons or more.

30-(A5), Orleans, Nebr., to Sheffield Steel Corp., Kansas City, Mo.

130 tons, includes 90 tons bars, and 40 tons wire mesh, paving, Milwaukee avenue, city of Chicago, to Bethlehem Steel Co., Bethlehem, Pa.; J. A. McGarry & Co., Chicago, contractors; bids June 18.

120 tons, highway construction and overpass, Berlin, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; Didgini Arrigoni, contractor.

115 tons, overpass, Norfolk county, Virginia, to Virginia Steel Co., Richmond; W. N. Jackson, Roanoke, Va., contractor.

101 tons, clothing renovation plant, quartermaster depot, Kansas City, Mo., to Sheffield Steel Corp., through Universal Construction Co., Kansas City.

100 tons, clothing renovation plant, quartermaster depot, Kansas City, Mo., to Truscon Steel Co., Youngstown, O.

100 tons, paving, Milwaukee avenue, city of Chicago, to Universal Highway Products Co., Chicago; Standard Paving Co., contractor; bids May 19.

100 tons, storage buildings, Avon signal corps station, Ken., to Truscon Steel Co., Youngstown, O., through Fleischer Engineering & Construction Co., Buffalo.

REINFORCING STEEL PENDING

10,000 tons, government ordnance storage depot, Kendaia, N. Y.; Poirier & McLane, contractors.

6000 tons, naval base work in Pacific Ocean; sub-bids being taken by contractors, Pacific Naval Base, Alameda, Calif.

2350 tons, Anderson Ranch dam, Idaho; bids July 7.

2200 tons, quartermaster's warehouse, Seattle; Western Construction Co., Seattle, low, $1,525,450.

1700 tons, flood wall, army engineers, Jeffersonville, Ind.; bids July 24.

500 tons, Panama, sch. 5279; bids in Washington.

500 tons, river front boulevard, contract 11, Pittsburgh; bids July 22.

470 tons, three over-crossing, Los Angeles county, Calif., for state; bids opened.

450 tons, building addition, Standard Milling Co., Buffalo.

285 tons, Feather River bridge, Nicolaus, Calif.; bids opened.

255 tons, high school, San Jose, Calif.; bids in.

220 tons, bridges, Dauphin county, Pennsylvania; bids to state highway department, Harrisburg, Pa., July 18.

200 tons, high school, Alpena, Mich.; Spence Bros., contractors.

170 tons, two pumping stations and two dikes, army engineers, Lowell, Mass.; bids July 16.

155 tons, building, American Medical association, Chicago; George A. Fuller Co., contractor.

123 tons, Medico-Physic building, University of California, Berkeley, Calif.; bids opened.

100 tons, power plant, navy yard, Norfolk, Va.; Burns & Roe, contractors.

100 tons, runways etc., airport, West Lebanon, N. H.; M. DeMatteo Construction Co., Milton, Mass., low.

Unstated, state underpass at Worley, Idaho; bids to Boise, July 11.

Unstated, navy storehouses and magazines, Oyster Bay, Wash., depot; Hoard & Stingl, Seattle, awarded at $168,736.

Semifinished Steel

Semifinished Prices, Page 101

Allocation of additional British tonnage focuses attention on semifinished steel, where there is considerable dissatisfaction with present circumstances.

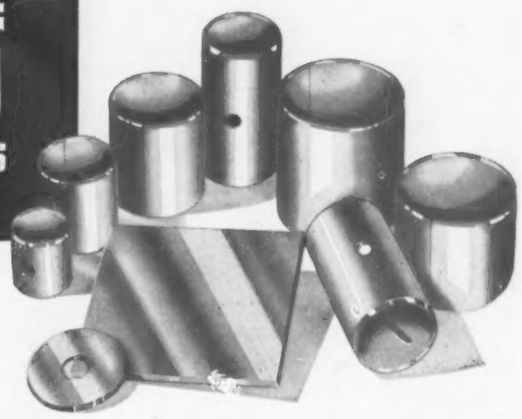
The feeling is growing among mill men that British buying should be shifted more to finished products wherever possible, to insure enough semifinished material to keep American finishing mills running at capacity. In some cases there is considerable opposition to taking any further British business because it is felt prices are too low.

This condition has been aggravated because it is known that British steel mills are still shipping finished products in the export market, and are still taking orders, notably in South America, in competition with American mills.

Semifinished material for domestic consumption on non-defense work is tighter, with rods and sheet bars virtually closed. There is some slight flexibility at the moment because of the automotive situation, which will disappear when shipments are resumed. Because of the price situation, a number of shifts have been made in supply lines between integrated and nonintegrated mills.

SOMETHING NEW in BEARINGS

by JOHNSON BRONZE



Pre-Cast Bearing Bronze on Steel

Write for this

folder that fully describes this new and unusual bearing. It's FREE.

Here is a new and unusual bearing material that has already established many new records of performance. *Pre-Cast Bearing* BRONZE ON STEEL, a thin wall, laminated type of bearing, combines the bearing qualities of bronze with the strength of steel.

The bronze alloy—S.A.E. 64, in powder form—is permanently bonded to strip steel. The process of manufacturing bearings or bushings from *Pre-Cast Bearing* BRONZE ON STEEL is essentially a stamping and forming operation. As a result, few bearings are as economical as *Pre-Cast Bearing* BRONZE ON STEEL, particularly when there is production quantities.

Pre-Cast Bearing BRONZE ON STEEL is also available in rolls—up to 400 feet in length—or as plates, washers or various types of stampings. It will pay you to investigate this new type of bearing. A request, on your business letterhead, will bring you complete information plus a sample bearing. Write TODAY.

JOHNSON BRONZE
Sleeve BEARING HEADQUARTERS
550 S. MILL STREET • NEW CASTLE, PA.

Pig Iron

Pig Iron Prices, Page 102

Tight conditions are developing in pig iron supply and operations of foundries and small steelmakers are threatened with shortage. Pig iron producers have felt increasing demand since the price ceiling was announced and many refuse to entertain inquiries from any but regular customers. In spite of this limit on sales it is not certain sufficient iron will be available for the latter as considerable capacity in the eastern portion of the country is engaged in producing iron for delivery to Great Britain, with indications the tonnage for that purpose may be increased this month.

The supply hinges entirely on blast furnace capacity as supply of ore, coke and limestone are ample. Several stacks now out for repair will be back soon. The Tennessee Coal, Iron & Railroad Co. will blow in its No. 2 stack at Ensley, Ala., within a fortnight and Jones & Laughlin Steel Corp., Pittsburgh, has relighted a stack at its Eliza furnace after relining.

In Southern Ohio the only local producer is out of blast and prices on iron delivered in Cincinnati and other consuming points is based on Hamilton, O., with freight added. This limits possible outside purchases because of the low furnace price. Southern pig iron producers are not shipping iron to northern melters as freely as usual, freight rates and higher production costs because of increased mine wages making it less profitable. This reduced supply increases demand on northern stacks.

Some consumers in great need have been able to obtain relief by direct appeal to Washington on defense work. New priority schedules, expected this month, may ease the situation somewhat.

Frequently no bids are received on pig iron inquiries for the navy, 223 tons of foundry for Norfolk, Va., recently going begging. The department of supplies and accounts, nevertheless is asking supplemental bids on 378 tons for delivery at Philadelphia, Brooklyn and Puget Sound, most being for Philadelphia, July 11, sch. 6225.

With some confusion continuing as to whether the 50-cent differential for 50 points of manganese above one per cent applies to basic, eastern sellers have been further advised by OPACS officials that it does, or at least it is optional with the individual furnace. Apparently, it was not originally intended to apply, but in view of the manner in which the ruling was phrased, officials in Washington have decided to let it stand as applying to basic and some producers are quoting on this basis.

Orders against the 240,000-ton inquiry for bessemer and low phosphorus pig iron for Great Britain under the lease-lend program are being issued in piecemeal fashion. Approximately 85,000 tons have thus been distributed among several producers to date, mainly bessemer, with the possible exception of a small tonnage of special low phosphorus. The original inquiry called for delivery over a period of five months, beginning with July. Whether this full program will be realized remains to be seen. There is unquestionably a shortage of pig iron, and particularly of low phosphorus.

Scrap

Scrap Prices, Page 104

Scrap flow has not been increased appreciably, although trading is somewhat more active, following further interpretations by OPACS. Clarification of base prices and switching charges has helped and it is expected other revisions will be made, as many inequalities remain.

The principal difficulty now is the increasing tonnage passing directly from producer to consumer instead of through normal channels. The government apparently is following this plan, turnings and borings at one arsenal now being returned to companies that supplied the steel. Formerly this material was offered for bids by dealers. The same practice is growing among automotive manufacturers, where offerings are smaller in the face of heavy automobile production. As a result of this situation brokers accustomed to handle industrial tonnage find their supplies reduced and melters de-

pending on these suppliers are facing possible shortage.

Scrap production by manufacturers engaged in non-defense work is declining and that from plants engaged in defense work is expanding. A substantial volume in the aggregate is moving but scarcely sufficient to support present heavy steel production. Consumer stocks are being used and are dwindling to the danger point in many cases. Small foundries are buying material wherever available and taking truck delivery on small lots.

Regulations by the government have pegged prices but apparently have not stimulated gathering and distribution of scrap from remote areas. Present prices are too low to tempt collections in locations removed from consuming districts. Trading is practically on a spot basis and few commitments are being made for future delivery, brokers being unable to assure themselves of tonnage far ahead.

Some scrap from Detroit territory is prevented from going to distant mills because of restrictions of the $1 springboard clause in OPACS regulations. Sentiment among brokers is pessimistic, and much of the former incentive and keen competitive spirit have been washed out of the scrap business by government control.

Foundries in Eastern Pennsylvania are definitely short of cast scrap and some are operating only three days a week, though they could be on full schedule if raw materials were available.

Buffalo interests report a steady movement of scrap from the Atlantic seaboard up the canal, for delivery to Canadian melters. Dealers at Buffalo are receiving little material from outside the district, lake shipments having become much less than recently.

Pacific Coast

San Francisco—Featuring the market this week was the award of 4000 new freight cars for the Southern Pacific Co., involving 63,200 tons of steel.

Consumers of steel products find it increasingly difficult to obtain material when needed and in many instances contractors in an endeavor to obtain the necessary steel and who have received sub-bids from competitive interests have approached the second, third and fourth highest bidder and find it difficult, even then, to secure the steel.

The most active market was that for structural shapes and demand continues strong. Over 105,000 tons are pending.

Plate awards totaled only 450 tons. As far as can be ascertained the Seattle-Tacoma Shipbuilding Corp., Tacoma, Wash., has not yet placed 72,000 tons for 30 C-3 type cargo vessels recently awarded by the United States Maritime Commission.

Supplies of cast iron pipe in distributors' yards are badly depleted, due to lack of shipping space when foundries can handle orders or when proucers cannot fill orders when space is available. Awards aggregated 700 tons and brought the total to date to 30,009 tons compared with 19,925 tons for the corresponding period in 1940.

Seattle—National defense projects this week completely overshadowed the market in this area, heavy awards featuring the situation.

Of major importance is the plan of Boeing Aircraft Co. to erect a $10,000,000 plant to build flying boats for the navy on the shore of Lake Washington, Seattle, steel construction involving about 2000 tons of concrete bars and 12,000 tons of shapes. Main assembly building will be 900 x 1100 feet, also warehouses, boiler house, paint, machine shops and other units. The Austin Co. is expected to receive the award.

Bonneville project this week awarded contracts totaling $3,450,000 for transmission lines, and electrical equipment and announces appropriation of $7,200,000 for 230-kv second Bonneville-Coulee line, 341 miles, and 115-kv. Bonneville-Vancouver line and 230-kv. steel tower crossing at Bradford Island. At Fort Lewis eight building and facilities contracts, totaling $500,000, were awarded this week. The Umatilla ordnance depot, Hermiston, Ore. has been given a $3,145,841 supplementary

Simple, Sturdy

CJB AHLBERG

Ball Bearing

PILLOW BLOCKS

1. Precision self-aligning ball bearing.
2. One-piece sturdy housing.
3. Removable end cap.
4. No drag labyrinth ⌐¬ seals.
5. Simple mounting wrench.

Send for new 96-page Catalog No. 440 which gives detailed information on the complete Ahlberg line of Ball Bearings, Roller Bearings and Pillow Blocks.

THESE (CJB) pillow blocks are not a new development, but a proven design, with a ten year service background.

Their compactness and simplicity of design make them ideal for light and normal service, where a reliable yet inexpensive bearing is required.

The full self-aligning, precision type ball bearing, is mounted in a one piece, Parkerized, and accurately machined housing. Seals, to protect the bearing and retain lubricant, are non-wearing Neoprene rings, which turn with the shaft and float in the housing.

This labyrinth ⌐¬ type of seal is frictionless, long wearing, and exceptionally effective.

This series is available in shaft sizes from $\frac{5}{16}$" to $2\frac{3}{16}$", in either fixed or expansion types. Closed end type is optional.

AHLBERG BEARING COMPANY

Manufacturers of (CJB) Master Ball Bearings

3015 West 47th Street - - - Chicago, Ill.

contract bringing this project to a total of $10,760,534. United States engineer, Seattle, plans to award the contract for the 11.2 mile Alaska Railroad extension to West Construction, Southboro, Mass., at $3,524,966.

Pacific Car & Foundry Co., Seattle, has been awarded 3000 tons of steel for submarine nets for the navy.

Rolling mills and fabricating plants are giving first attention to army and navy requirements. Pending tonnages of reinforcing bars for defense projects in this area exceed 7500 tons. Army contracts for airbase gas storage facilities involve large tonnages of plates and other materials.

Cast iron pipe inquiries in excess of 750 tons are pending, some awaiting more definite delivery dates. Jobbing volume is heavy, dealers handicapped by low stocks and difficulty of making replacements. Rolling mills report ample supplies of steel scrap but cast iron scrap continues scarce and in strong demand.

Canada

Toronto, Ont.—In an effort to obtain more speedy delivery of steel necessary to the expansion of Canada's war industry some switching of contracts with primary producers has been undertaken by the government. In this connection it is stated that a large order for bar steel placed with an Ontario mill has been cancelled and the order given to another producer which is said to be better equipped for quick delivery. It is understood that efforts will be made to place business with companies which can give best delivery.

With placing of additional ship contracts representing outlay of upwards of $6,000,000 with two Ontario builders, further large orders for plates are pending. It is estimated that pending plate orders total upwards of 10,000 tons, a large part of which will go to the United States. One local U. S. mill representative states that numerous orders for plates are reaching his desk but his company is not in a position to accept the business.

While sheet bookings by Canadian producers are tapering the slackening is due entirely to reluctance of mills to accept more business. There has been no definite announcement that mills are refusing orders although consumers trying to place contracts recently have been advised to wait. Sheet backlogs extend well into 1942.

Merchant bar orders are increasing and most Canadian production has been contracted to the year-end. Civilian consumers experience more difficulty in obtaining deliveries as most shipments are going direct to war industries. Inquiries indicate further large expansion in demand.

Structural steel awards continue high. War construction projects take most steel from fabricating shops, practically all of which are booked almost solid to the year-end. Dominion Bridge Co., Lachine, Que., and Toronto, Ont., closed approximately 10,000 tons for war projects, while a further 8000 tons was booked by other fabricators in Ontario. Among the large orders pending is 5000 tons for new war industry in Quebec for the Canadian government and 2000 tons for a second plant near Montreal.

Orders for merchant pig iron are gaining but show little change in tonnage. Most shipments are under 300 tons, following the policy laid down by the steel controller that deliveries can be made only for immediate needs. Under the new ruling cancelling all forward delivery contracts melters now must place orders for each shipment, and these in turn go through the office of the steel controller for approval. Producers are maintaining deliveries of foundry and malleable grades at about 4000 tons weekly.

Increased action is reported in iron and steel scrap markets. Dealers and consumers are seeking new sources of cast scrap and while no speculative buying is being done consumers are jumping prices to obtain sufficient for current needs.

LET HACKNEY HELP YOU DESIGN A COMPETITIVE ADVANTAGE . . .

● Hackney special parts have increased the ompetitive advantages of scores of products. Many times Hackney deep drawn shells have been able to reduce overall weight . . . at other times strength has been increased . . . while often both results are obtained. Appearance is improved. Many times improved durability is brought about, due to Hackney's aid in designing and manufacturing some special part for an industrial product.

In the manufacture of compressors, for instance, Hackney air receivers add not only to the efficiency of the product, but to its salability as well. Shown above is a vertical type Hackney air receiver. Compressor and motor are mounted on the saddle, attached to the top head. This receiver of two-piece construction has only one body weld (circumferential) and is equipped with pressed steel legs. The A.S.M.E. inspection openings and other inlet and outlet openings can be seen.

Hackney welding and deep drawing have permitted savings on other manufacturing processes. And many times production has been speeded up, and the cost of an individual part has been reduced. Hackney, of course, works in all types of metals. Send today for complete information—Hackney engineers may be able to make practical suggestions for improving your products—or effecting cost reductions. There is no obligation.

PRESSED STEEL TANK COMPANY

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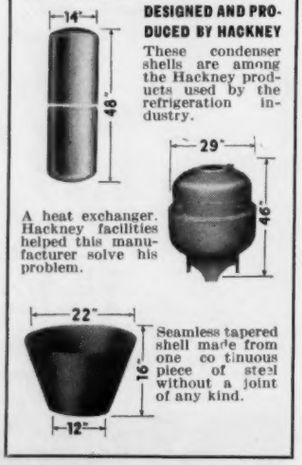
TYPICAL SHAPES AND SHELLS DESIGNED AND PRODUCED BY HACKNEY


14"
48"
These condenser shells are among the Hackney products used by the refrigeration industry.
29"
46"
A heat exchanger. Hackney facilities helped this manufacturer solve his problem.
22"
16"
12"
Seamless tapered shell made from one co tinuous piece of steel without a joint of any kind.

Containers for Gases, Liquids and Solids

Nonferrous Metal Prices

July	Copper, Electro, del. Conn.	Copper, Lake, del. Midwest	Copper, Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
3	12.00	12.00	12.25	53.00	52.12½	5.85	5.70	7.25	17.00	14.00	35.00
4—Holiday											
5	12.00	12.00	12.25	53.00	52.12½	5.85	5.70	7.25	17.00	14.00	35.00
7	12.00	12.00	12.25	53.00	52.25	5.85	5.70	7.25	17.00	14.00	35.00
8	12.00	12.00	12.25	53.00	52.25	5.85	5.70	7.25	17.00	14.00	35.00
9	12.00	12.00	12.25	53.25	52.37½	5.85	5.70	7.25	17.00	14.00	35.00
10	12.00	12.00	12.25	53.25	52.37½	5.85	5.70	7.25	17.00	14.00	35.00
11	12.00	12.00	12.25	53.50	52.62½	5.85	5.70	7.25	17.00	14.00	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.10
Zinc, 100 lb. base	12.50

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York	9.25
Cleveland	9.50-10.00
Chicago	9.00-9.25
St. Louis	9.00

Heavy Copper and Wire

New York, No. 1	10.25-10.37½
Cleveland, No. 1	10.00-10.50
Chicago, No. 1	10.00-10.25
St. Louis	10.00

Composition Brass Turnings

New York	9.00

Light Copper

New York	8.25-8.37½
Cleveland	8.00-8.50
Chicago	8.00-8.25
St. Louis	8.00

Light Brass

Cleveland	4.50-5.00
Chicago	6.25-6.50
St. Louis	5.00

Lead

New York	4.95-5.10
Cleveland	4.75-5.00
Chicago	4.75-5.00
St. Louis	4.50

Old Zinc

New York	4.50
Cleveland	4.00-4.12½
St. Louis	5.00

Aluminum

Mis., cast	11.00
Borings, No. 12	9.50
Other than No. 12	10.00
Clips, pure	13.00

SECONDARY METALS

Brass ingot, 85-5-5-5, l. c. l.	13.25
Standard No. 12 aluminum	16.00

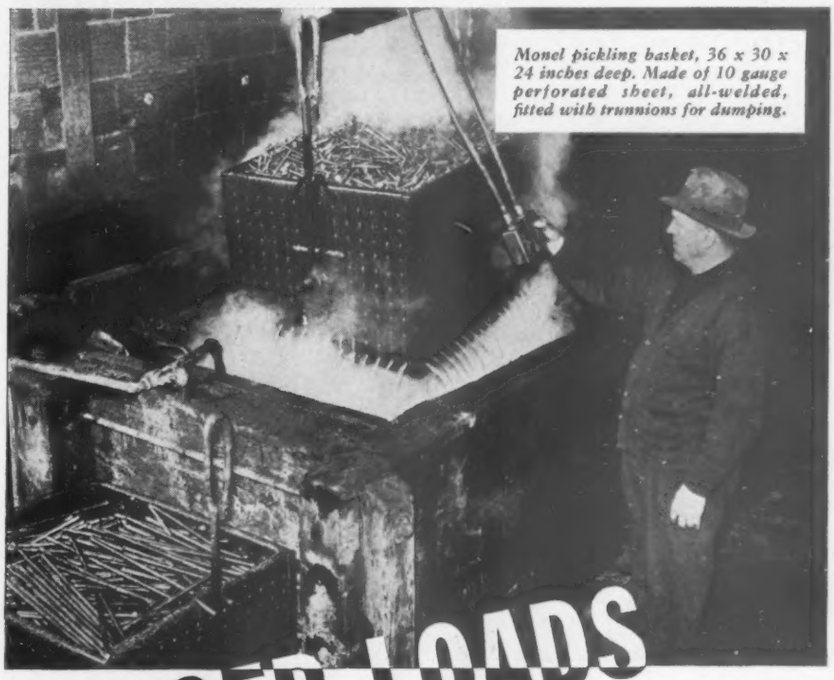
Nonferrous Metals

New York — With production, shipments and fabrication of nonferrous metals at peak rates without covering needs fully, the government is expected to extend its control further over the markets.

Copper—General preference order providing priority control over copper was amended to make it effective over copper-base alloys and fabricated products made from copper or from copper-bearing base alloys, such as brass or bronze. Because of the shortage in copper, the amendment stipulates that after copper has been set aside for the OPM emergency pool, defense orders must be given preference over non-defense orders. Additional changes are to be made in the copper order later on to provide a fuller measure of control over all copper supplies.

Lead—The trade awaits purchase by the Metals Reserve Co. of a large tonnage of refined lead from Canada, Mexico, and Peru. Demand remains in excess of the tonnage produced here and imported as refined lead.

Zinc—Total producer and consumer stocks are less than 65,000 tons. Head of the OPM conservation unit suggests a 9-cent price



Monel pickling basket, 36 x 30 x 24 inches deep. Made of 10 gauge perforated sheet, all-welded, fitted with trunnions for dumping.

BIGGER LOADS

yet FASTER HANDLING...

Change from wood to Monel brings 5 Big Benefits

This all-welded Monel pickling basket is one of five in use by Seyler Manufacturing Company, Etna, Pa. Made by Youngstown Welding & Engineering Co., of Youngstown, Ohio, it weighs only 307 lbs., yet carries loads of bolts, washers, lag screws, etc., weighing up to 2500 lbs.

Built to replace wood, these all-welded Monel baskets have shown in service 5 important advantages:

1. *10% greater load capacity* with same outside dimensions.
2. *Quick and easy handling* in loading, transporting, and dumping.
3. *Faster Pickling*, due to better circulation of acid through all parts of load.
4. *Rejects eliminated.* Threads of heavy bolts previously became imbedded in wood, did not clean, were improperly galvanized.
5. *No maintenance* or loss of service during repairs.

Many plants are utilizing the advantages of Monel pickling equipment, thus speeding defense production. Write for information on Monel pickling equipment. Address:

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York, N. Y.

MONEL

"Monel" is a registered trade-mark of The International Nickel Company, Inc., which is applied to a nickel alloy containing approximately two-thirds nickel and one-third copper.

Behind the Scenes with STEEL

Pittsburgh Party

■ Pittsburgh scrap circles are still talking about the big party last week. Invitations read: "Twenty Years Together. Joe Jacobson and Amos Bowman, upon completion of twenty years together (and before they both go on a diet) request your presence at a Cocktail Party and Buffet Dinner on July 1, 1941 at 6:30 P. M. in the Urban Room, William Penn Hotel, Pittsburgh, Pa." Joe and Amos scale in at about 500 pounds between them, and incidentally represent Luria Bros. Co. The party was about the same size—replete with food and drink, floor show and 40 beautiful hostesses, count 'em—40, scrap dealers and purchasing agents. Joe and Bow were presented with a check apiece by their company, and suitable but inaudible speeches were made by those who so desired. STEEL's prodigious Pittsburgh editor, Bob

Hartford was there to enjoy it all and snapped the accompanying picture of the two principals as they greeted one of their guests, L. E. Urhich of Oliver Iron & Steel Co.

Scarfing

■ Steelworks editor, John Knox ran headlong into the clutches of a Youngstown head librarian a few weeks ago and came out second best. John, of course, has lived and breathed this steelmaking business for lo these many years and can qualify as an expert—at or away from home. But says the librarian in this case, "How am I going to index that article of yours on *Scarfing*—there ain't no such word!" "Oh yeh," says John, and pulled out his big Websters only to hunt long and hard in vain. "The word," she says, "is *scarifying*, regardless of what the gentlemen in the mills may call it"—and right she is.

Longfellow

■ That reminds us of another librarian who was asked the meaning and correct spelling of Lake Chaugogagogmanchaugagochaubunagungamaug, which as you may know is up near Webster, Mass. That two-score tongue-twister is usually abbreviated to the last six syllables and according to our best Indian interpreter means: "You fish on your side, I fish on my side, nobody fish in the middle!"

Very Funny

■ If you don't mind secondhand stories, a friend of ours just told us about a navy friend of his who was home last week for a short leave from Atlantic patrol duty. Our friend quizzed the navy man for just a little inkling of what was going on out there but got nowhere. "I can't tell a thing," said the officer, "except that it was very funny when we made into shore this last trip we suddenly discovered we'd lost all our torpedoes and depth bombs." Probably the sea gulls swiped them one night when everyone was asleep.

Competition

■ *The New Yorker* magazine may have something with their quip on the recent industrial awards to two west coast airplane workers. One prize went to Bill Holcomb, Lockheed foreman, for inventing an electromagnetic riveting gun and another prize to Boeing's Oscar Leibst for a structural design eliminating the use of rivets and clips! Quipped the *N. Y.*: *That's science for you—lousy with ideas but no direction.*

Wing Tips

■ This week on page 41 you will find the first appearance of a regular feature in STEEL which we modestly predict will rival, even before its baptismal ink is dry, those other two companion features, Mirrors of Motordom and Windows of Washington. Don't miss "Wing Tips" this week.

SHRDLU

for zinc to bring out extra ore production.

Tin—Consumption in May increased 8½ per cent while that in solder alone increased 24 per cent. This was reported just after the National Academy of Sciences had recommended a sharp reduction in tin solders and spoke of saving 75 per cent of the amount used by substitution. Prices advanced to the basis of 53.50c for Straits spot, the highest since last February. Supplies continued in excess of demand though over several weeks consumers willingly buy all the tin offered in order to increase their reserves.

■ Fifteenth anniversary of General Electric Co.'s all-steel refrigerator cabinet was recently observed at a dinner honoring W. L. Merrill, who developed the cabinet, and J. L. Knight, refrigerator cabinet engineering department. Forty-eight members of the General Electric organization attended the dinner, in Erie, Pa.

Steel in Europe

Foreign Steel Prices, Page 108

London—(*By Cable*)—Steel prices in Great Britain are unchanged although furnace coke has been advanced 1s 3d per ton. Pig iron supplies continue satisfactory except in hematite. Steel supplies are sufficient to insure satisfactory delivery on war contracts. Rolling mills are working at capacity. Large demand continues for sheets, special steels and shipbuilding material. Tin plate production continues severely restricted.

Tungsten Ore

Shipments of Bolivian tungsten begin this month against a 3-year contract recently signed by the Metals Reserve Corp., which outbid Japan for practically the entire output of that country for that period. The contract calls for the delivery of a minimum of 10,000 tons over the three years and a maximum of 14,000 tons.

Bolivian production over recent months has been expanding steadily, so that some in the trade believe total shipments will be nearer the maximum than the minimum. During the first World war, it is said, Bolivian production jumped from 965 to 3500 tons a year. Almost immediately after the end of hostilities it dropped to around 500 tons.

Meanwhile, shipments from China are coming through steadily, although as a matter of policy tonnage is being delivered in relatively small lots. For instance, in June a shipment of 400 tons came in, and a similar tonnage is scheduled to arrive this month and about 600 tons in August. Since the emergency began about a year ago approximately 7600 tons has been received, it is estimated.

Domestic production of scheelite is being stepped up, with some

trade leaders estimating an increase this year of about 40 per cent, which would bring the output up to around 6000 tons.

The relative stability in ore has been reflected in tungsten products. For instance, in tungsten metal powder, 98-99 per cent, the principal commercial grade, prices have held at around $2.50 to $2.60 per pound, depending upon quantity.

Aluminum Scrap Dealers Cautioned by Stettinius

■ Priorities Director Stettinius last week cautioned the foundries and melters, consumers and dealers of aluminum scrap that scrap may not be sold to processors who do not have A-10 preference ratings. Some smelters and dealers have misinterpreted the order, which did not restrict sale or transfer of scrap between dealers although banning deliveries to smelters without preference ratings.

Mr. Stettinius said a number of cases have been reported where scrap is sold to processors without ratings in the belief that the limitations of the order apply only to deliveries for defense purposes. "The interpretation that scrap can be sold to processors without an A-10 rating if it is intended for non-defense purposes is incorrect," he said.

Small Producers Quote "F.O.B. Mill Prices"

PITTSBURGH

■ Smaller mills are taking advantage of the revised OPACS Price Schedule No. 6, permitting all steel producers to quote on the basis of the basing point nearest the place where the product is produced, rather than at the basing point providing lowest delivered price. They are in effect quoting f.o.b. mill prices, freight charges to be paid by customers. This is made necessary by steadily increasing costs, a number of producers being in red ink.

There is a tendency on their part to take new orders from all customers on this basis and general adoption appears to be in prospect.

The larger, completely integrated mills are proceeding cautiously. They have not as yet applied this f.o.b. pricing plan to their regular customers and there is not now any intention of doing so. These mills take the position that as they have been opposing the f.o.b. setup for many years it is to their advantage to maintain the basing point system, to be able to compete for business outside their immediate territory after the emergency is ended.

However, the larger sellers are applying f.o.b. mill prices on some business. This is mainly for defense products and is termed "dislocated" tonnage, in that points of delivery generally are far outside the normal sales "sphere" of the mills involved, meaning that freight charges are high.

Tool Steel Scrap

Cents per pound, to consumers f.o.b. shipping point

Tungsten types

For each 1% tungsten contained

Solid scrap containing over 12%	1.80c
Solid scrap containing 5 to 12%	1.60
Turnings, millings containing over 12%	1.40
Turnings, millings, solids under 5%	1.25

Molybdenum Types

Solid scrap, not less than 7% molybdenum, 0.50 vanadium	12.50
Turnings, millings, same basis	10.50
Solid scrap, not less than 3% molybdenum, 4% tungsten, 0.50 vanadium	13.50
Turnings, millings, same basis	11.50

$120,000,000 U. S. Orders For Aluminum in Canada

(*Concluded from Page 47*)

from Canadian and British governments.

Research Industries Ltd., Toronto, a government-owned company, has received an order for $40,000,000 worth of British radiolocators. Device, adaptable for use on land or sea and in the air, detects approaching aircraft miles away by means of electrical waves which are broken when a plane passes through.

Department of Munitions and Supply, in the week ended June 27, placed 3591 contracts with $31,689,497 total valuation. Awards placed with United States companies aggregated $5,823,0334. The orders:

Shipbuilding: Port Arthur Shipbuilding Co. Ltd., Port Arthur, Ont., $3,840,000;

Shaped Wire, Welding Electrodes and General Wire

In this period of emergency, when National Defense takes precedence, many find it possible to use new production standards on new or substitute materials.

We know from experience that many users of shaped wire have been able to adapt standard production shapes to replace shapes that require special mill runs.

The shapes shown above suggest a few of the many which are standard that PAGE turns out—widths up to ⅜" and end section areas to approximately .250 square inches.

PAGE STEEL AND WIRE DIVISION
MONESSEN, PENNSYLVANIA

PAGE HI-TENSILE "F"
High speed welding, a shield-arc type electrode for vertical, horizontal or overhead.

•

PAGE HI-TENSILE "C"
A shield-arc type electrode for maximum strength, penetration and uniformity—vertical, horizontal or overhead welding.

•

PAGE-ALLEGHENY STAINLESS
Shield-arc type electrodes from which you can select one that will give you weld metal in welds that equals the stainless you weld.

In Business for Your Safety

ACCO
AMERICAN CHAIN & CABLE COMPANY, Inc.

Dufferin Shipbuilding Co. Ltd., Toronto, $2,499,600.

Dockyard supplies: Canadian John Wood Mfg. Co. Ltd., Toronto, $14,386; William Kennedy & Sons Ltd., Owen Sound, Ont., $21,260; British Ropes (Canadian Factory) Ltd., Vancouver, B. C., $22,885.

Land transport: General Motors Products of Canada Ltd., Oshawa, Ont., $1,428,242; Goodyear Tire & Rubber Co. of Canada Ltd., New Toronto, Ont., $18,705; Metallic Roofing Co. Ltd., Toronto, $295,650; Hamilton Bridge Co. Ltd., Hamilton, Ont., $24,800; Ford Motor Co. of Canada Ltd., Windsor, Ont., $32,876.

Aircraft: Canadian Pratt & Whitney Aircraft Co. Ltd., Longueuil, Que., $84,097; Fairchild Aircraft Ltd., Longueuil, $8283; Aviation Electric Ltd., Montreal, Que., $91,561; Bristol Aircraft Products Ltd., Montreal, $226,550; Canadian Car & Foundry Co. Ltd., Montreal, $6114; Canadian Wright Ltd., Montreal, $71,027; International Paints (Canada) Ltd., Montreal, $7219; S. & S. Aircraft Ltd., Ottawa, Ont., $42,768; Fleet Aircraft Ltd., Ft. Erie, Ont., $84,056; Amalgamated Electric Corp. Ltd., Toronto, $24,840; Easy Washing Machine Co. Ltd., Toronto, $60,767; Wagner Brake Service Co. Ltd., Toronto, $5550; Smith & Stone Ltd., Georgetown, Ont., $8975.

Electrical equipment: Aviation Electric Ltd., Montreal, $5807; Canadian Marconi Co., Montreal, $18,023; R. C. A. Victor Co. Ltd., Montreal, $13,689; Canadian General Electric Co. Ltd., Ottawa, $20,452; Canadian Westinghouse Co. Ltd., Ottawa, $16,405; Northern Electric Ltd., Ottawa, $31,458; Canadian Telephones & Supplies Ltd., Toronto, $15,191; Willard Storage Battery Co. of Canada Ltd., Toronto, $12,750; Small Electric Motors (Canada) Ltd., Leaside, Ont., $45,930; Service Lamp Co. Ltd., London, Ont., $6452.

Instruments: Canadian General Electric Co. Ltd., Ottawa, $28,522; Ontario Hughes-Owens Co. Ltd., Ottawa, $81,977; Viceroy Mfg. Co. Ltd., Toronto, $8234.

Machinery: Dominion Hoist & Shovel Co. Ltd., Montreal, $29,982; Edward Webb & Sons, Toronto, $31,065; A. R. Williams Machinery Co. Ltd., Toronto, $6075; Lufkin Rule Co. of Canada Ltd., Windsor, $5078.

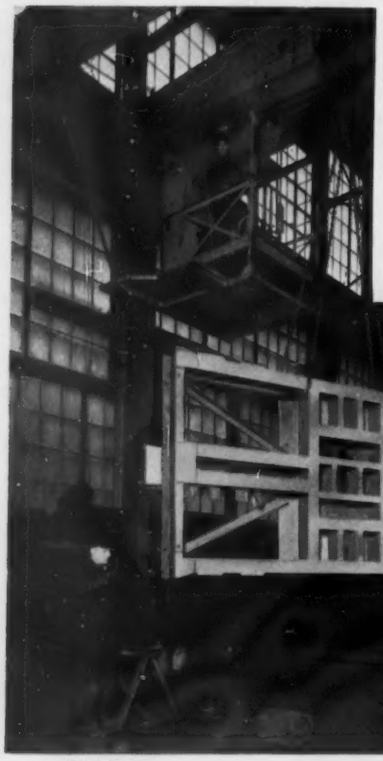
Ordnance: Gauthier & Julien, Portneuf Station, Que., $45,350.

Munitions: International Flare Signal Co. Ltd., Waterloo, Que., $119,891; Canadian Industries Ltd., Montreal, $6742; Defense Industries Ltd., Montreal, $27,913; Gurney Foundry Co. Ltd., Toronto, $26,145; T. W. Hand Fireworks Co. Ltd., Cooksville, Ont., $16,485; Dominion Electrohome Industries Ltd., Kitchener, Ont., $17,852; Chatham Malleable & Steel Products Ltd., Chatham, Ont., $7356.

Metals: British Metal Corp. (Canada) Ltd., Montreal, $143,672.

Miscellaneous: Canadian Locomotive Co. Ltd., Kingston, Ont., $27,600; Canadian Industries Ltd., Montreal, $13,206; General Steel Wares Ltd., Toronto, $96,500; Galt Malleable Iron Co. Ltd., Galt, Ont., $22,360; Canadian General Rubber Co. Ltd., Galt, $75,385; Kaufman Rubber Co. Ltd., Kitchener, $39,730; Gillette Safety Razor Co. of Canada Ltd., Montreal, $11,700; Pal Blade Corp., Montreal, $14,400; Dominion Bridge Co. Ltd., Lachine, Que., $8312; New Brunswick Electric Power Commission, St. John, N. B., $10,000; Hydro-Electric Power Commission of Ontario, Toronto, $600; Nelson River Construction Co. Ltd., Winnipeg, Man., $8000; Waterman-Waterbury Mfg. Co. Ltd., Regina, Sask., $35,000; Truscon Steel Co. of Canada Ltd., Walkerville, Ont., $8000; Western Steel Products Corp. Ltd., Ottawa, $15,000; Horton Steel Works Ltd., Toronto, $25,000.

War construction projects: Coast Construction Co., Vancouver, B. C., RCAF station, $208,000; A. Janin & Co. Ltd., Montreal, RCAF station, $370,000; J. H. Porter & Sons Ltd., Montreal, dock at Halifax, N. S., $128,000; Dominion Bridge Co. Ltd., Lachine, Que., steel for RCAF station, $100,000; Acadia Construction Co. Ltd., Halifax, N. S., $77,975; Stewart Construction Co. Ltd., Sherbrooke, Que., $267,352; Atlas Construction Co. Ltd., Montreal, erection of war materials plant in Quebec, $5,349,000; Ontario Construction Co. Ltd., St. Catharines, Ont., $92,750.



Welding economy is never obtained this way . . . . .

It is the interval between welds, the *positioning* time that eats into the profits of production welding. Eliminate the *extra* moves and you save money right away. You can do it by "setting-up" *just once* on a C-F Positioner for *all* welds . . top, bottom and sides.

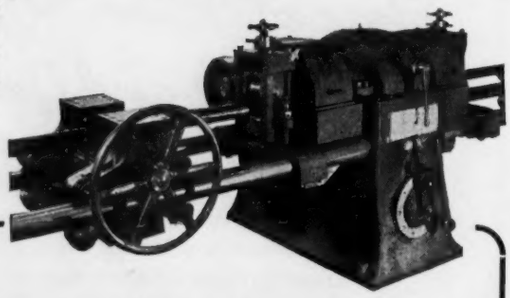
Here are three men and a crane positioning a weldment which the idle *welder could do himself* without *any* help if it were set up on a C-F Positioner. Furthermore, "down-hand" welds are better welds and C-F Positioned welds are *all* "down - hand" welds.

Q. E. D.

Write today for our informative circular WP20 which explains the C-F Positioner method of better, safer and more economical welding.

CULLEN-FRIESTEDT CO.,
1308 S. KILBOURN AVE. CHICAGO ILLINOIS

MEDART Type HF
Continuous Automatic
Centerless Bar Turner



MEDART Centerless Bar Turners

High speed turning machines for turning round bars and tubes — automatic and continuous production — adaptable to precision turning or rough peeling — available in several types.

THE MEDART COMPANY
3520 DeKalb St. • • • St. Louis, Mo.

MEDART

CONSTRUCTION and ENTERPRISE

Ohio

CLEVELAND—Parker Appliance Co., 17325 Euclid avenue, is erecting three buildings in addition to expansion program started in April, including storage building 120 x 400 feet, factory building 100 x 380 feet and laboratory building 100 x 220 feet, the three to cost about $285,000.

CLEVELAND—Hertner Electric Co., 12690 Elmwood avenue, is taking bids through Walter G. Caldwell, architect, 838 Engineers building, for a one-story plant with 14,640 square feet floor space and wing with 1920 square feet for oven room.

CLEVELAND—Reliance Electric & Engineering Co., 1088 Ivanhoe Road, is adding about 2560 square feet, costing about $8000.

ELYRIA, O.—Bendix Westinghouse Automotive Air Brake Co., 901 Cleveland avenue, is taking bids on a concrete and steel loading dock 28 x 243 feet, through Argonaut Realty division of General Motors Corp., Detroit.

Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 108 and Reinforcing Bars Pending on page 111 in this issue.

EUCLID, O.—E. W. Bliss Co., 22501 St. Clair avenue, has let contract for a one-story 100 x 112-foot addition, to the Austin Co., 16112 Euclid avenue, Cleveland, at about $50,000.

MANSFIELD, O.—Humphrey Mfg. Co., 201 East Fifth street, manufacturer of plumbing supplies, has let contract to Jacob Wolf Co., 11½ West Fifth street, for one story addition 80 x 100 feet, to cost about $12,000.

NEW PHILADELPHIA, O.—Election will be held August 12 on $100,000 in bonds for a sewer system. A. Rosch is city engineer.

New York

NIAGARA FALLS, N. Y.—Frontier Bronze Corp., 210 Franklin street, Buffalo, has plans by W. A. Cannon, Niagara Falls, for a foundry, office and pattern storage building, to cost about $40,000.

New Jersey

GARFIELD, N. J.—Heyden Chemical Corp., plans a new powerhouse at its chemical works, estimated to cost $300,000, with equipment.

Pennsylvania

ERIE, PA. — General Electric Co., Schenectady, N. Y., will build $10,000,000 plant here for production of turbines, with about 225,000 square feet floor space. Machine tool equipment will cost $9,000,000, the remainder being for the structure.

ERIE, PA.—American Boiler Works, foot of State street, is having plans prepared for an additional plant unit, to cost about $50,000.

GROVE CITY, PA.—Borough council plans extensions and improvements in the municipal electric power plant and additional equipment. Chester Engineers

● Just because RHOADES METALINE OILLESS BEARINGS have nothing to do with oil and grease . . . Just because they are so clean the food, textile, paper and tobacco industries use them everywhere . . . Don't get the idea that they cannot take on hard, heavy, speedy and hot jobs.

● You'll find them helping make steel where the severest demands are made on bearings—in furnace doors, annealing cars, soaking pit headers, hot shears, conveyor rolls, derricks and all sorts of other places. For more than three-score years,

● METALINE OILLESS BRONZE BEARINGS have done hard work in steel plants. Today they are used more widely than ever before, for plant and production men know they are reliable and give good service a long time.

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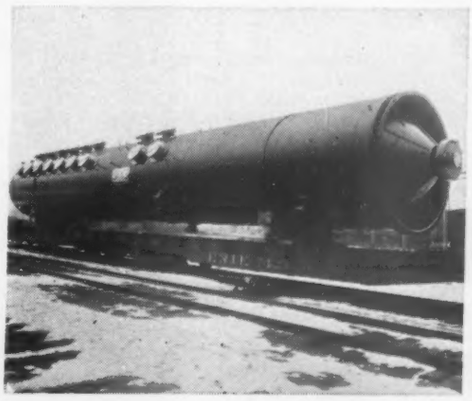
"Right the first time ...and right on time!"

It's a 49-year tradition here at Sharon to deliver each order on schedule and exactly as specified. You can place your steel fabricating jobs with us in complete confidence. The resources of General American Transportation Corporation, joined with the steel skill of the veteran personnel taken over intact from P. I. W., assure unsurpassed service on pressure vessels, storage tanks, and other riveted or welded steel equipment.

GATX GENERAL AMERICAN PLATE & WELDING DIVISION PLANT AT SHARON, PA



"FLUID FUSION" WELDED VESSELS are now made EXCLUSIVELY by

PLATE AND WELDING DIVISION
GENERAL AMERICAN TRANSPORTATION CORP.
Successor to Plate & Welding Div., Petroleum Iron Works Co. (P. I. W.)

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MAKE HIS WORK LESS *BORING*

Photo—Warner & Swasey

. . . by furnishing him with BISCO Alloy and Tool Steel Tubing that meets your exacting requirements for such items as ring dies, bushings, forming rolls, etc. With the right combinations of inside and outside diameters stocked for immediate shipment, long, costly hours of lathe work on solid rounds are no longer necessary.

Let us mail you our current stock and price list on BISCO Alloy and Tool Steel Tubing.

THE BISSETT STEEL CO.

900 EAST 67th STREET, CLEVELAND, OHIO

Inc., 210 East Parkway, Pittsburgh, is consulting engineer.

Michigan

DETROIT—Motor Tool Co. will build an office and factory building on Turner avenue. R. H. Neubrecht is architect.

DETROIT—Redford Tool & Die Co. will build a plant addition from plans by Jensen & Keough, Detroit, architects.

DETROIT—Brown Lathe Corp. has been incorporated with $25,000 capital to manufacture lathes and tools by Milton J. Miller, 2003 Dime Bank building, Detroit.

HOLLAND, MICH.—Holland Precision Parts Co. will build two additions to its plant. Van Dyke & Volkers Co. has general contract.

LANSING, MICH.—Fusing Engineers Inc., 415 Hollister building, has been incorporated with $25,000 capital to operate a welding and repair business, by Walter E. Lindell, 425 Everett street.

LANSING, MICH.—Olds Motor Works has given contract to Christman Co. for a three-story factory building 132 x 172 feet. Argonaut Realty Co., Detroit, is architect.

Illinois

CHICAGO — Ford Motor Co., 126000 South Torrence avenue, plans extensions and improvements to its powerhouse, including turbine generating unit and auxiliaries. Shreve, Anderson & Walker, Marquette building, Detroit, are architects and engineers.

CHICAGO—Mid-Continent Metal Products Co., 105 West Adams street, has been incorporated with 1000 shares $100 par value, by Carleton M. Tower and associates, 105 West Adams street.

EAST PEORIA, ILL.—Caterpillar Tractor Co. is having plans made for large expansion of its plant here, said to cost over $500,000.

ROCKFORD, ILL.—Rockford Bolt & Steel Co., manufacturer of bolts, nuts, screws, washers, etc., has let general contract to Linden & Sons Inc. for a one-story plant addition 60 x 160 feet. R. R. Wood, Melrose Park, Ill., is engineer.

ROCKFORD, ILL.—Greenlee Bros. Co., manufacturer of woodworking machinery, tools and saws, has given general contract to Security Building Co. for construction of a one-story addition 73 x 230 feet. R. R. Wood Melrose Park, Ill., is engineer. (Noted April 7.)

ROCKFORD, ILL.—George H. Spengler Co., manufacturer of screw machine products, has given general contract to Linden & Sons Inc., for a one-story plant addition, R. R. Wood, Melrose Park, Ill., is engineer.

Missouri

BOLIVAR, MO.—Southwest Electric Co-operative, L. L. Alexander, superintendent, has let contract to Stovall Construction Co., West Plains, Mo., for 124 miles rural electric lines to serve 274 customers. Midwestern Engineering Co., Tulsa, Okla., is engineer.

POPULAR BLUFF, MO.—Mississippi River Fuel Corp. is building a booster station for its gas pipe line near here. The building will cost about $5000 and equipment will bring the total to about $150,000.

ROBERTSON, MO.—McDonnell Aircraft Corp., Lambert-St. Louis municipal airport, will let contracts soon for construction of an addition costing $512,000. Palmer & Lamdin, 1021 St. Paul street, Baltimore are architects. (Noted May 26.)

WEST PLAINS, MO.—Howell-Oregon Electric Co-operative, Joseph R. Hinds, superintendent, has let contract to Stovall Construction Co., West Plains, for 152 miles rural electric lines to serve 287 customers. Midwestern Engineering Co., Tulsa, Okla., is engineer.

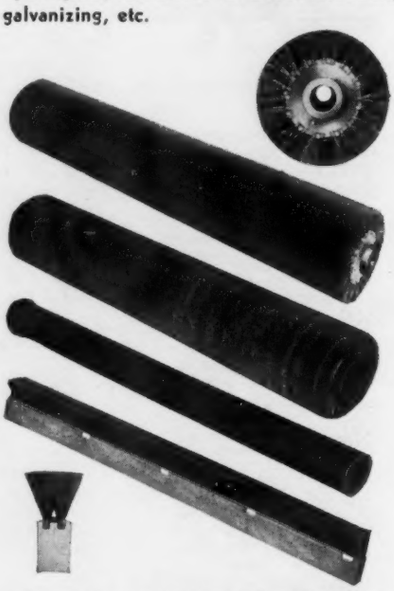
ST. LOUIS—Barrett Equipment Co., 2101 Cass avenue, has given contract to Murch-Jarvis Co., Cotton Belt building, 408 Pine street, for a one-story 47 x 130-foot addition to its plant at 2103 Cass avenue. H. Van Hoefen, 408 Pine street, is architect.

ST. LOUIS—Emerson Electric Co., 1824 Washington avenue, has given contract to the Austin Co., Arcade building, St. Louis, for design and construction of an airplane gun turret manufacturing plant, to be operated for the war department

Fuller

STEELGRIPT BRUSHES

Steelgript Brushes have greater holding and non-shedding qualities, resulting in longer life and more dependable operation. Less frequent replacements will save time and money. Furnished in straight strips for Tin Middlings or continuous (close or open spiral) formations for Sheet Scrubbers, galvanizing, etc.



Send your blue prints and specifications for quotations on your particular requirements.

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INDUSTRIAL DIVISION — DEPT. BC

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Will Your Product Pass Final Inspection?

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Today as never before—

accuracy in 'tenths' means gage accuracy in Millionths!

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"Originators of Chromium Plated Gage Blocks"

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Why EVERY PLANT *should use a*

LYON

HYDRAULIC Elevating Table for

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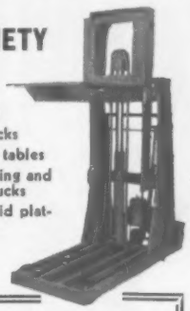

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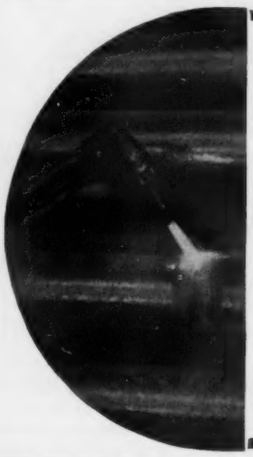

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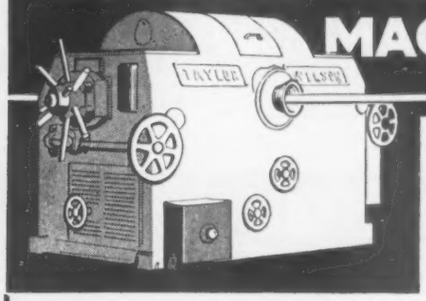

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172 EAST CARSON ST. PITTSBURGH, PA.

on a tract adjacent to its new plant at 8100 West Florissant road, St. Louis county.

ST. LOUIS—St. Louis Car Co., 8000 North Broadway, manufacturer of railroad and street railway equipment, is constructing three additional buildings at 600 Bittner treet, one story 162 x 232 feet, 240 x 300 feet and 80 x 232 feet, to cost over $100,000, with equipment.

ST. LOUIS—American Can Co., 230 Park avenue, New York, will award contracts soon for a new plant costing about $1,750,000 on a 30-acre tract at Juniata street and Kingshighway. Plans are by company architect, C. G. Preis. Plant will be one story, 621 x 1035 feet, with office 50 x 175 feet and cafeteria and service building 100 x 375 feet.

Wisconsin

MILWAUKEE—Milwaukee Steel Foundry Co. has let general contract to Klubertanz Bros. for a foundry plant on South Water street. Walter Grierson is engineer.

MILWAUKEE—Geuder, Paeschke & Frey Co., manufacturer of sheet metalware, stampings and containers, has let general contract to Meredity Bros. for a plant addition 135 x 190 feet on North Fifteenth street. Fred R. Rankl, 121 East Washington street, is engineer. (Noted June 9.)

MILWAUKEE—Ampco Metal Inc., 1745 South Thirty-eighth street, is building a foundry addition doubling present floor area, containing 60,000 square feet floor space, partly double-decked. Keirleber Construction Co. Inc., Milwaukee, is contractor.

OSHKOSH, WIS.—Wisconsin Axle division of Timken Detroit Axle Co. will build an addition, one story 66 x 144 feet and two stories 66 x 44 feet, costing $15,000, as one of a series of units in an expansion program.

WAUTOMA, WIS.—Waushara County Electric Co-operative Inc., Julius Waala, secretary, is taking bids on 308 miles of electric transmission lines. Wisconsin development authority, Tenney building, Madison, Wis., is engineer.

WEST ALLIS, WIS.—Allis-Chalmers Mfg. Co. has bought 20 acres on the outskirts of Milwaukee, site of a former Inland Steel Co. plant, for a $12,500,000 plant to manufacture superchargers for the government.

Minnesota

MINNEAPOLIS—American Can Co. is preparing to build additional canmaking facilities in this district at cost of several million dollars, to serve the northwest area for general line and packers' cans.

WILLMAR, MINN.—Einar H. Brogren, city clerk, will open bids July 14 for improvements and equipment for the municipal light and power plant, including electric switching and control equipment, deaerating and feed water heater and boiler feed water pumping unit. Williams & Burlingame Inc., Stillwater, Minn., are engineers.

Texas

HOUSTON, TEX.—Houston Shipbuilding Corp., Electric building, has let contract for 27 x 250-foot plate shop on ship channel, to Brown & Root, 4300 Calhoun road, at about $95,000.

Kansas

GORHAM, KANS.—City plans installation of a waterworks plant costing about $50,000, including steel tank on tower, watermains, two deep wells, pumps and pumphouse. Paulette & Wilson, Salina, Kans., are engineers.

INDEPENDENCE, KANS.—City will vote July 29 on $100,000 bond issue for city's share of municipal airport estimated to cost about $200,000, federal funds to aid.

STERLING, KANS.—Arkansas Valley electric co-operative, Alvia B. Davis, superintendent, has let contract to Palmer & Bergen Construction Co., Trengon, Mo., at $268,941, for construction of 407 miles of rural transmission lines to serve 632 customers. Paulette & Wilson, Topeka, Kans., are engineers.

WICHITA, KANS.—Coleman Lamp & Stove Co., manufacturer of gasoline pressure lamps and electric household appliances, has given general contract to Hahner & Foreman for a one-story plant addition 78 x 140 feet. Lorentz Schmidt is architect.

WICHITA, KANS.—Beech Aircraft Co., manufacturer of airplanes, plans a one-story maintenance shop 100 x 160 feet. Overend & Boucher, Brown building, are architects.

Iowa

CEDAR RAPIDS, IOWA—Iowa Mfg. Co., manufacturer of sand and gravel machinery, and bituminous mixing plants, has let general contract to Loomis Bros. for a two-story plant addition 60 x 80 feet.

FORT DODGE, IOWA—City, H. R. Sittig, clerk, will take bids to July 17 on addition to sewage disposal plant, including sludge pumphouse and equip-

YEARS STRETCH BACK PRETTY FAR . . . BACK TO THE YEAR THIS COMPANY WAS FOUNDED . . . . . .

In 1916 we began making steel sheets, and now, in 1941, we are still going strong. Many of our old friends have strung along with us for a quarter of a century; we are thankful to them, and to the many other friends we have acquired since the year before U. S. entered World War I. Our facilities have improved through the years, and we are looking forward to the next 25 years with pride and confidence.

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Prevent Heat Sickness

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THE Shakeout Package makes Fairway Saltabs available to field workers and men in plants not equipped with Fairway Dispensers. For many years Fairway Saltabs have been a standby in hot industries; Saltabs are a valuable aid in the prevention of heat sickness.

The Shakeout Package contains a full 250 tablets, yet it fits easily in the pocket. It keeps the Saltab fresh and clean. You'll like the handy pouring spout which folds snugly out of the way when not in use.

Fairway Saltabs are popular with the men because they are effective and so easy to take. The Shakeout Package is moderately priced; each worker should have his own supply. Order plenty and be prepared.

**The name 'Saltabs' Reg. U. S. Pat. Off.*

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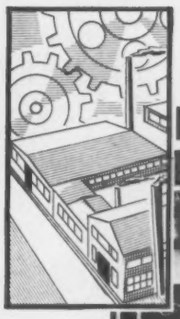

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Original, Low Temperature, Patented Method
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Protects and beautifies; lowers finishing costs; speeds production.
Ask for details. Sample JETAL*ized free.*
ALROSE CHEMICAL CO., Providence, R. I.
the JETAL process

ment, to cost about $150,000.

MORNING SUN, IOWA—City plans construction of municipal light and power plant to cost over $50,000. R. W. Gearhart, 349 Twenty-first street S. E., Cedar Rapids, Iowa, is consulting engineer.

SLATER, IOWA—City plans to build a municipal light and power plant to cost about $50,000. R. W. Gearhart, 349 Twenty-first street S. E., Cedar Rapids, Iowa, is engineer.

California

INGLEWOOD, CALIF.—Precision Aeronautical Parts Mfg. Co. has been formed by Jerome P. Hoffman and associates and will establish business at 308 West Redondo boulevard.

LOS ANGELES—Southern California Gas Co. is building a concrete tank 38 x 273 feet, mostly below ground, at 932 Lyon street, costing $200,000. Contract has been let to Bartlett Hayward Co., Baltimore, for a steel structure on top of the tank, to cost about $500,000.

LOS ANGELES—Keystone Engineering Co., 1442 South San Pedro street, will build a machine shop addition 50 x 80 feet, costing about $5000.

LOS ANGELES—Mechanical Specialties Co. has been organized by Frank L. Odenbreit and associates and will establish business at 719 East Gage avenue.

LOS ANGELES—Cinch Lock Corp. has been incorporated with $100,000 capital by George Leingang and associates, Glendale, Calif. A. S. McConnell, 402 Pacific Mutual building, Los Angeles, is representative.

LOS ANGELES—Hughes Aircraft Co., 7000 Romaine street, will build two new plant buildings in the Baldwin Hills district, 39 x 46 feet and 79 x 148 feet, to cost about $37,000.

SAN DIEGO, CALIF.—San Diego Tool & Die Co., 345 Fifteenth street, has been formed by Rudolph Bentle and associates.

Oregon

PORTLAND, OREG.—Schnitzer Steel Products Co., 33 N. W. Yeon avenue, is installing a small rolling mill and electric furnace in its plant.

PORTLAND, OREG.—Stauffer Chemical Co. is having plans made for a sulphate of alumina plant here, first unit to cost $100,000, production planned by Nov. 1, A. C. Mohr, San Francisco, is superintendent.

Washington

EVERETT, WASH.—Pinehurst water district will vote July 26 on a proposed bond issue of $75,000 for a water supply system.

OLYMPIA, WASH.—State toll bridge authority has appropriation of $75,000 and will prepare plans for new span to replace collapsed Tacoma Narrows bridge, pending settlement of insurance suit.

SEATTLE—Olsen & Winge Marine Works, 4125 Burns avenue N. W., will build an addition to its machine and joiner shop and craneway, 60 x 85 feet.

SEATTLE—Puget Sound Sheet Metal Works, 3641 East Marginal Way, is erecting a sandblast building. The Austin Co. is contractor.

Canada

KINGSTON, ONT.—Public utilities commission, 19 Queen street, is taking bids for two gasoline-driven centrifugal pumps, capacity 300 imperial gallons per minute. Gore & Storrie, 1130 Bay street, Toronto, Ont., are engineers.

SAULT STE. MARIE, ONT.—Algoma Steel Corp. Ltd., Wilde street, has let contract to McLarry & Hanna, 173 Spring street, for main building in connection with its new blooming mill. Entire project will cost $4,000,000, financed by the Canadian government.

TORONTO, ONT.—Sully Brass Foundry Ltd., 7 Wabash avenue, will build a plant addition costing about $45,000, with equipment. D. J. Benham, 351 Windemere avenue, has general contract.

WELLAND, ONT.—United Steel Corp. Ltd., King street, has let contract to Gardiner Construction Co. Ltd., River Bank street, for a plant addition costing about $75,000, with equipment.

WINDSOR, ONT.—Walker Metal Products Ltd., 1511 Kildare road, will build a plant addition costing $42,000, without equipment, general contract to Hein Construction Co., 172 Aylmer avenue.

MONTREAL, QUE.—Allied War Supplies Corp. Ltd., a government-owned company, 420 Lagauchetiere street West, has let contract to Dufresne Construction Co. Ltd., 1832 Pie IX boulevard, for a new plant to cost about $1,000,000.

"HERCULES" RED-STRAND WIRE ROPE

You Can Depend On "Hercules" (Red Strand) Wire Rope

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1. Acid Open-Hearth Steel Wire
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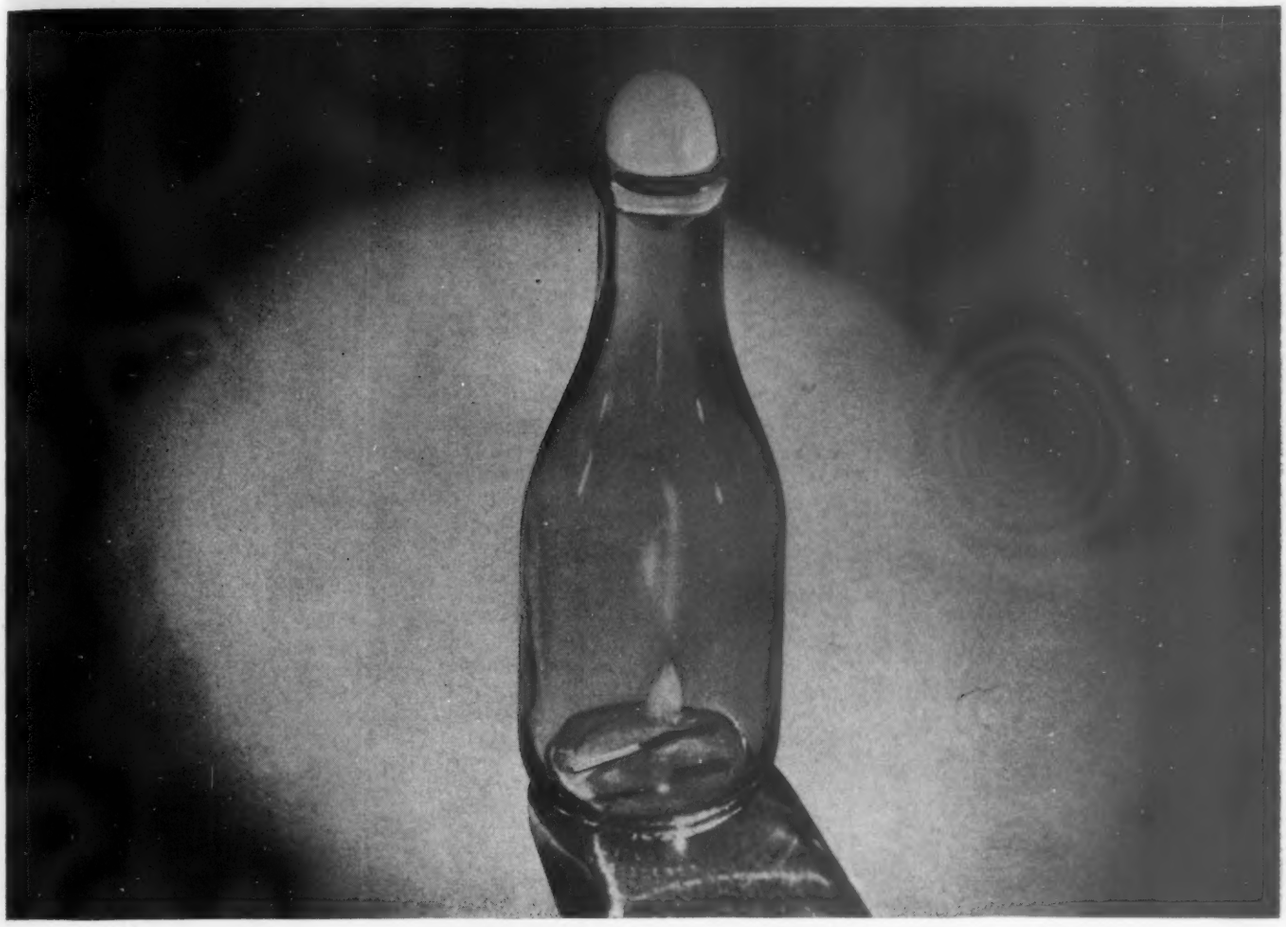


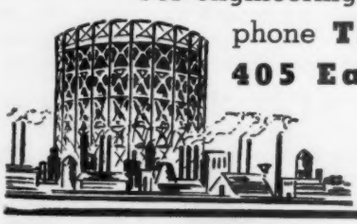
HOW'S *Your* BOTTLE-NECK?

If it's a heat processing operation that is choking off production, causing rejects, boosting costs, the solution may be as simple as getting the hard-boiled egg into the milk bottle.

Progressive steel plants throughout America have found the Kemp principle of pre-mixing of gas and air provides the means of speeding production in tin stacks, in bright annealing, of faster roll heating, provides controlled atmospheres and controlled flame characteristics and pressures *automatically!*

Fuel savings of 15 to 40 percent may be expected, but these days production advantages outweigh economies. Bottle-necks come before pocketbooks. But when you can aid *both,* why not?

For engineering aid or data on your own special problem, write, wire or phone **The C. M. Kemp Manufacturing Company, 405 East Oliver Street, Baltimore, Maryland**



KEMP of BALTIMORE

Comments FROM... STEEL's Readers

To the Editor:

The "Bessemers" are blowing
And the "Open Hearths" are glowing,
Red molten metal flowing
Into Moulds.

Ingots, on their buggies resting
For the soaking pits fierce testing,
And that white hot heat digesting
Huge blocks of steel.

Ingots, having passed the stripping,
Leave the pits white hot and dripping,
And are ready for the gripping
Blooming Mill.

Into the "Bloomers" jaws pell mell
With a boom and roar like hell,
Ten tons are squeezed like jell,
Into a bloom.

Then rolling, forging, shaping,
And raw steel is in the making
Of ships and tanks, earth quaking,
And big guns.

And the men who make the steel
Are skilled and work with zeal
For their own and country's weal,
And friends abroad.

For our sons and sons to be
In the air, on land and sea,
Must be free from tyranny,
And ever free.

So keep the metal flowin'
And the open hearths aglowin'
And the rolling mills a goin'
Men of Steel.

RODNEY H. REESE
Green Bay & Western Lines,
Pittsburgh

Fluorspar May Become Scarce

To the Editor:

Under the heading of "Cryolite from Fluorspar" you published an interesting letter on the Readers' Comments page, STEEL, June 30.

I do not have any information regarding the consumption of natural cryolite, but understand the maximum tonnage expected to be brought in during 1942 is 25,000 tons, and that this is subject to the ability of shippers to obtain bottoms.

The Bureau of Mines, could, if so disposed, give you information regarding importations of cryolite, and the use of high grade spar by the aluminum industry, and others requiring a similar grade of spar.

At present washed gravel fluorspar, or the so-called fluxing spar, is in relatively easy supply, but I am of the opinion that as a result of the requirements of the steel industry, the demand will increase as we get further along in the year. This, not so much due to any possible increase in consumption, but to the policy of consumers to accumulate a sufficient stock before Jan. 1 to take care of requirements during the first three months of the following year. During that period shipments would likely reach destination in a frozen condition, and then again because of river conditions, it is usually difficult, if not altogether impossible, to make shipments by barge during January, February and March.

There is a mistaken feeling on the part of consumers regarding the available supply, many buyers being under the impression that fluorspar production can be readily increased on short notice, when just the contrary is the fact.

The fluorspar industry has been put on notice that it should be prepared to supply at least 225,000 tons of gravel spar during 1942 and from 60,000 to 75,000 tons of high grade spar, suitable for the aluminum industry, and other industries requiring that grade of spar. Unless there is more development, the industry may have difficulty in supplying the desired tonnage of gravel spar, and is almost certain to have some trouble in producing the required high grade spar.

Prices of gravel spar are showing a disposition to advance, and I feel are almost certain to be higher very shortly, and later in the year.

FLUORSPAR DEALER
Chicago.

Readers are invited to comment upon articles, editorials, reports, prices or other editorial material appearing in STEEL. The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for with-holding his identity. Letters should be brief —preferably not exceeding 250 words

Practical Use of Shell Articles

To the Editor:

I have received the following letter from J. Halfpenny, chief industrial engineer, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.: "STEEL has sent me the fine brochure on the manufacture of high explosive shells. I was delighted to see the way you used your broad background of knowledge on the subject to help the industry in this difficult problem. Our men in the shell plant at Ensley are making good use of your material."

A. F. MACCONOCHIE
Head, Dept. Mechanical Engineering
University of Virginia

"Your Presentation is Excellent"

To the Editor:

We think your presentation of the article, "New Instrument Transforms Hours into Minutes in Making Metal Analyses," STEEL, June 2, is excellent and we want to thank you for the opportunity to co-operate in its preparation. Should we receive any comments in which you may be interested we shall be pleased to pass them on.

J. P. GRIMWADE
Advertising division,
Leeds & Northrup Co.,
Philadelphia.

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